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ROCK AND WATER GARDENS

A WATER GARDEN.

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ROCK & WATER GARDENS: THEIR MAKING & PLANTING: WITH CHAPTERS ON WALL & HEATH GARDENING

BY

THE LATE F. W. MEYER

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PREFACE

COMPLYING with the wish of many readers ot THE GARDEN it has been determined to publish the instructive and interesting articles upon rock, wall, and water gardening that were written from time to time in that journal by the late Mr. F. M. Meyer. These articles are most comprehensive, and the additions that I have made will I hope increase the usefulness of the work. Not only is the extensive rock garden the subject of several chapters, but those who wish for information on the construction of rock gardens on a small scale are also considered.

The illustrations are of great teaching value, and are reproduced from photographs taken by Mr. Meyer, showing for the most part the works in various stages of development. Rock, wall, and water gardening have of late years increased in popularity, and added greatly to the beauty of the surroundings of the English home.

As Mr. Meyer indicates it is a mistake to crowd the rock garden with a host of plants that strive

for the mastery. In gardening, as in painting, no picture can be beautiful whose composition is crowded and compressed. There are various considerations that influence the choice of the plants that the rock planter will put together, but the following suggestions are commendable. First, to consider which are the plants that give us the truest pleasure. Then to consider which of these will group best together and flower at the same time; for supposing four or five favourite kinds of plants to be grouped and intergrouped, it is a great advantage to let them be those that will bloom together and make one complete picture, and to have the intermediate sets of groups to bloom later in their turn. This is a much more pictorial arrangement than to have the plants flowering in scattered irrelevant patches quite unrelated to each other.

Suppose, therefore, that a spur of rock garden is crowned with bushes of *Andromeda floribunda*, and that steep rocks below it are clothed with *Aubrietia* and *Arabis*, and that at their foot in cool peaty ground there is a generous planting of *Primula denticulata*. Here are four capital flowers of early April, all in full beauty together, making one complete picture, and these four are quite enough. The colouring is of the simplest, and delightfully harmonious, and the whole thing is so good a picture that one dwells upon it, and

one comes back to it to enjoy its beauty in a way that one never does the more mixed planting of individual objects.

It is of course more easy to do in large spaces, but even in small ones the same thing may be done in square inches instead of square feet by choosing plants of similar dimensions. Such an arrangement for the pictorial part of the garden by no means precludes the enjoyment of individual plants, but we think it is wiser to have these in a separate place in a series of rectangular beds, where each plant may occupy its own pocket, and be as easily visible and accessible as a book on a shelf or a specimen in an economic museum.

Mr. Meyer made a careful study of wall-gardening, and his essentially practical remarks will, it is to be hoped, stimulate greater interest in this delightful way of growing flowers that are seen in their fullest beauty amid such surroundings. An old wall filled with flowers is a picture of rare charm, but the planting must not be overdone. The safest guide is Nature herself, who will, if allowed full play, teach us many things we do not know. We have only to visit an old-fashioned garden where things are left pretty much to themselves to realise the truth of this. Old crumbling walls have many times been a source of the greatest pleasure to those who love their gardens, and we have seen alpines that have almost

baffled us to get established in the ordinary rock-work, quite at home in such places. Besides alpines, these old walls give room to other flowers. It is not an unusual sight to see old walls beautifully draped with the graceful Ivy-leaved Toad-flat, Pansies, and other flowers, while the top is gay with common Wallflowers, nay often *Linaria purpurea*, and such-like plants. We believe, indeed, that many hundreds of alpines may be grown in this way finer than in any other, and they will survive our damp winters much better than on the rock garden, where a large percentage is probably lost through over-abundant moisture.

The chapters upon the water garden and moisture-loving plants show the wealth of flower beauty that is available.

A chapter that I think will be of the greatest interest concerns "The Heath Garden." This has been written by Mr. W. Dallimore of the Royal Gardens, Kew, the well-known authority on trees and shrubs.

E. T. COOK

February 1910.

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ROCK AND WATER GARDENS

CHAPTER I

FIRST WORDS

Of all the numerous branches of horticulture, there is perhaps none more abused than the making of rock gardens. Many are the instances in which an otherwise pretty garden has been spoiled by so-called rockwork badly constructed and utterly out of character with its surroundings. It must be borne in mind that no rocks of any kind can possibly be an ornament to a garden unless they are either natural, or appear to be so, and are associated with suitable plants.

Can anything be worse than the average villa garden on sloping ground, where, in spite of regular outlines generally, rockwork is introduced in the shape of actual rows of stones almost uniform in size and placed mostly upright on their ends? But builders and jobbing gardeners still vie with each other in putting up these monstrosities. Nor are they the only sinners. In plenty of larger gardens the same plan unfortunately is followed. A heap of soil or

rubbish is thrown up, it is studded with stones and a few plants, and the rock garden is finished. I know hundreds of instances in which the work was carried out precisely on these lines, and it is no wonder that—with such examples of bad taste before them—the owners of many estates are altogether prejudiced against rock gardens of any kind, even when the site and its surroundings are suitable.

It may be argued that gardens on sloping ground would often make stonework necessary in order to keep up the soil. This I willingly admit, but in most cases simply a plain wall would have been more suitable. In the case of a terrace wall the latter can be adorned with all kinds of choice flowering creepers. If stonework is absolutely necessary to keep up the sides of paths or drives, it would be better to erect a plain "dry" retaining wall, in which the joints would be filled with good soil instead of cement or mortar—this would be admirably adapted for "wall gardening" —than construct a long and narrow line of rock-work which could never look natural in such a position.

A wall garden may be made beautiful and interesting, and a rock garden which has an absolutely natural appearance may be made more beautiful and more interesting still. But the fact cannot be too strongly emphasised that the horrid structures

referred to above, which are neither one thing nor the other, *i.e.*, which resemble neither wall nor rock, are absolutely out of place, and without being entirely reconstructed they can never be transformed into a thing of beauty. The subject of wall gardening will be dealt with separately under the heading of "Wall Garden Making." I propose under the heading of "Rock Garden Making" to deal systematically with this interesting subject, giving practical hints based on actual experience. This, I hope, may be useful to others, and assist them in deciding what to do and what to avoid. I do not for one moment wish to recommend my method of constructing rock gardens as right and condemn all other methods as wrong, but I will merely give the result of my own experience, and will inquire into the principle of theory and practice of rock garden making according to the lessons taught by Nature, and I leave others to draw their own conclusions.

What is a Rock Garden?

A rock garden is that portion of a garden which contains either natural rocks or rocks artificially arranged in such a way as to appear natural, and on which mountain plants of all kinds can thrive. It is not a question of size, the kind of rock, or the kind of plants to be used.

These are mere details, depending on circumstances. It matters not, therefore, whether the rock garden is many acres in extent or only a few yards. Neither does it matter whether it is composed of granite, limestone, or any other rock, or whether it is furnished with plants from the Himalayas or Norway, Switzerland or Colorado. The all-important point is that it must be absolutely natural in appearance, and therefore in harmony with its surroundings.

Without this last-named condition the ground can never be a proper rock garden in the true sense of the word. It may have stonework covered by plants of the coarser kinds; we may have elaborate cement or plaster works somewhat resembling rocks, on which, however, no plants can grow. But in all such work the greatest charm of a rock garden—viz., natural simplicity—will be absent; and for this reason a really natural-looking rock garden of only a few yards in extent will be infinitely more pleasing to the eye than the most extensive or the most elaborate structure which does not comply with these conditions, but betrays its artificial origin at a glance.

A rock garden enables one to cultivate a much larger variety of plants than would be possible to obtain from ordinary beds or borders. It can be so arranged as to be a source of delight dractically all the year round. It will enable us

to grow even the minutest gems of the alpine flora, more especially as the moist climate of these islands is such that in some instances alpine plants, if properly planted, will grow even better than in their native home. A rock garden, properly constructed, should be of that wild and rugged character which is so fascinating in the works of Nature, and though we can never introduce into our gardens the majestic grandeur of the Alps, we can at least have ground which is picturesquely treated and broken up so as to represent mountain scenery *in miniature*. Since we have mountain plants from all quarters of the globe at our command, our picture can make up in variety what it may lack in grandeur.

It must not be supposed that in planting a rock garden we must restrict our choice of plants to those from certain districts only, just because we find them so associated and distributed in nature. This would be going decidedly too far. There is no reason why we should not improve upon nature, and, if we have embraced a chance of embellishing our rock gardens with plants from various zones, we have taken a forward step in that direction, for we can by that means prolong the flowering season and make our rocks practically an attractive feature in the garden even at a season when the rest of the garden is dull and uninteresting.

Many people are of opinion that rocks to be picturesque must invariably be associated with water. Water in almost any form imparts life and light into the landscape, and into the rock garden in particular. But visible water is not indispensable, and I hope to show that very pretty rock gardens on a large or small scale can be made without having the additional advantage of running water.

From the foregoing it must not for one moment be inferred that a rock garden is essential in every garden, large or small. On the contrary, the introduction of rockwork into some gardens would be absurd, if the surroundings are not such as would be suitable to a more or less rugged treatment. My argument is that nothing can be prettier or more desirable than a well-made rock garden in the right place, but also that nothing could possibly be worse than rockwork out of place.

It is with a view of arriving at some satisfactory solution of the problem as to how to deal with various grounds and under varying conditions that I propose to go fully into this matter in the following chapters on "Rock Garden Making."

CHAPTER II

SUITABLE AND UNSUITABLE SITES

I HAVE already pointed out that no rock garden can be a success unless it represents a piece of wild, rugged nature. Hence it follows that the site must under all circumstances be an irregular one, and if it is not naturally irregular it must be made so by excavation or filling. An unsuitable site can never show rockwork of any kind to advantage. Even if the rock itself should have been skilfully executed, it will look out of place if the site and its immediate surroundings do not justify its presence. Such would be the case, for instance, near a large mansion standing on a flat expanse of almost level ground. In such a position the repose or dignity produced by an extensive lawn would be entirely destroyed by the unjustified introduction of rocks on almost level ground. Even if, where the rocks are desired, irregularity is produced by sinking a large pit, a rock garden on such a site would still look unnatural. If the surrounding ground is flat the artificial depression would be meaningless, and it will appear as if it

had no business to be there and ought to have been filled up. It is seldom possible to produce a good rock garden near a house, as, naturally enough, in almost every garden the immediate surroundings of the house would be treated with more or less regularity.

The case is different, however, if the house stands on hilly ground, or if, in order to produce the level space required for the house, it was found necessary to cut deeply into the hill, leaving steep banks almost close to one side of the building. By still deeper excavation and by making irregular recesses such a site can often be made most suitable for a rock garden. In all probability it would be possible to face the rough, irregular banks with stones in such a way as to convey the idea that the house was built in a large recess sheltered on one side by natural rocks. Nor would it be necessary to face the whole bank with stones, for often a somewhat scattered appearance of rocks protruding from the surface only here and there looks more natural and picturesque than more massive structures, to say nothing of the greater facility in construction and the reduction in the cost.

The most unsuitable sites for rock gardening are long, straight, and narrow borders. For wall gardening they may be ideal sites, but to produce in them the natural appearance demanded by a

A SUITABLE SITE FOR A ROCK GARDEN, SHOWING PREPARATORY WORK.

THE SAME SITE TWELVE MONTHS LATER.

rock garden will in most cases be found impossible. The site for a rock garden should not be near large trees. Not only would it be impossible to grow the choicer alpine plants under the drip of trees, but the latter would also send their hungry roots into the crevices prepared for the rock plants. They would not only exhaust the ground, but would in time dislocate the stones by the swelling of their roots. Where it is impossible to keep the rock garden far enough away from such trees as to be out of harm's way, it would be best to cut a deep, narrow trench, say twelve feet or so in depth, filling this with a concrete through which even the roots of large elm trees could not penetrate. This, however, adds considerably to the cost. In laying out a garden it often happens that after the more or less regular parts near the house have been completed satisfactorily there remains some remote corner which is quite irregular, and the owner is at a loss to know what to do with it. The probability is that such a spot could be made into an ideal rock garden. Such a site is shown in illustration No. 1, which represents the ground set apart for a large rock garden constructed in some extensive private grounds at Paignton. That the site was a suitable one may be gathered from the second illustration (No. 2), which was prepared from a photograph I took twelve months later. In the centre of the first picture will be

than the ground was before, then stout walls must be built, which are afterwards supported by large quantities of soil, forming outside banks in such a manner as to be dipping towards—not away from—the water. I shall go more fully into this matter when speaking of water gardens in connection with rocks, but one most important item in connection with preparatory work for ponds must be pointed out here. In order to prevent the cement concrete or walling of a pond from being visible after the work is complete, it is necessary to build a kind of shoulder about six inches or eight inches below the actual water level. This shoulder is to support either stones or turf which might thus dip right into the water and prevent a stiff appearance.

In the background of illustration No. 1 such a step or shoulder is clearly visible around the space for a pond close by the large trees. Illustration 2 shows in the foreground a small portion of the same pond twelve months later. The stones and turf are resting on this shoulder below the water level, and not a trace of the shoulder or masonry of any kind can be discerned.

With regard to other preparatory work, I may briefly mention that, as a matter of course, good drainage must be provided, and that in excavating portions of the ground good and bad soil should be mixed before the actual rock building begins,

but should be put aside in separate heaps easy of access when wanted. It would also be well to deposit the stones or other materials required not too close to the place where they are to be used, and to spread them out so that any individual stone might be easily selected without turning over the whole heap. If the stones are deposited "best side upwards" it will greatly facilitate the work and save a lot of turning over. If placed too close to the field of operations the stones are too apt to be in the way, and sometimes have to be moved several times.

Appliances for Moving and Carrying Stones

When the rock garden is on a large scale, necessitating the removal of stones weighing sometimes several tons, a small trolley running on portable rails like a miniature railway will be found of enormous advantage in saving labour.

Illustration No. 1 shows a stone about a ton in weight resting on such a trolley, which can be easily pulled along the rails. The rails are shifted in any direction within a few minutes, and are supported by planks. This method, however, would of course apply only to work on a very large scale. A most handy appliance is a little two-wheeled trolley with a long pole, which might be made to act as a lever in loading the stone.

But stones up to two tons in weight can easily be shifted without any other appliances than planks, rollers, and iron bars or wooden hand-spikes as levers. If such a stone rests on a broad plank or, better still, on a couple of short planks clamped together side by side and running on rollers supported by planks on the ground, it will be found an easy matter to move it by forcing it on with the levers. For hoisting heavy stones a large tripod and double blocks are usually employed. If it is possible to land the stones so that, in order to be put into position, they have to be let down instead of hoisted, an iron winch will be found most useful in letting them down gradually. This will be treated more in detail when dealing with the actual fixing of stones in a subsequent chapter.

CHAPTER III

THE BEST STONE TO USE

THE question of stones is important in the making of rock gardens, and much depends on a good selection. To use two or three different kinds for the same work—as is often done—is, I consider, a great mistake. There is no reason why rock gardens made of different materials should not occupy different parts of the garden, if it be sufficiently large. For instance, we may have a limestone rockery in one part, and, say, a granite rockwork in another, but to mix them is not advisable, as it would be unnatural. To my mind, the most unsuitable of all kinds of stones for rock building are bits of glaring white spar or other gaudy stones covered with glassy crystals or of a general vitreous appearance. Owners of quarries generally put aside these pieces and sell them to would-be rock builders under the name of "fancy rockery." For convenience of easy handling these stones are generally broken up into pieces of almost uniform size, *i.e.*, about one foot to two

feet in length. For a collection of minerals these pretty crystals may be well enough, but they should never be used for rock building, except perhaps when crushed or broken into small fragments to mix with the soil for such alpines as love a gritty medium to grow in. They are the delight of such masons and jobbing gardeners whose ideas of rock building can never advance beyond the pudding-shaped heaps of soil studded all over and at regular intervals with these uniform bits of glaring spar or crystals. Such creations may still find admirers in the shape of amateurs without horticultural knowledge, whose only garden is a tiny plot in front of a small villa. But to people whose taste has been refined by the study of Nature the "loud" appearance of such stones is vulgar. Why? Because it is unnatural. In Nature we may find such material in the interior of caves or in hidden crevices, but never on the surface. And as we are—or should be—imitating Nature when building artificial rocks, the beauty of our garden must, under all circumstances, depend on its appearing true to Nature, the artistic grouping and blending of rocks and plants, and the picturesque effect as a whole, but never should it depend on the gorgeous colouring or staring crystals of individual stones.

The same objection, though in a less degree, may be raised against stones of a very new

appearance. They are, as a rule, too gaudy or too conspicuous to impart to the rockwork that natural appearance which pleases the eye. Sometimes, however,

NEWLY QUARRIED STONES

show a sombre tint of red or brown, and the new-looking grey, white, or bluish surfaces are visible only where the break occurred during blasting operations. Such stones as a rule are easily managed, for all that is necessary would be to place the new-looking surfaces inward, *i.e.*, where they might be covered either by soil or other stones, so that only the older-looking surfaces would show. This applies more especially to the various kinds of limestone.

Sometimes it happens that the estate on which a rock garden is to be constructed contains one or more quarry pits where stones might be obtained, and in most cases it would be far better to use what can be had on the spot rather than buy expensive material from a distance. If an old disused quarry is available as a site for a rock garden it would be a double advantage, as the old quarry itself might easily be made into a most picturesque rock garden. All that would be necessary would be to conduct the blasting operations in such a manner as to obtain a good lot of boulders. It often happens that these fall into

GEOLOGY IN THE ROCK GARDEN

Since it is impossible to construct a good rock garden without some knowledge of the works of Nature, I will briefly touch upon a few points which in this connection I consider of vital importance. Geologists divide all rocks into two great classes, namely:

(*a*) *Igneous rocks*, which are devoid of fossils, and show no proper stratification. These, it is assumed, were originally in a more or less liquid state caused by fusion, and were either poured out over the surface of the earth in a molten condition or were consolidated before reaching the surface.

(*b*) *Sedimentary* or *stratified rocks.*—These were formed under water, either through the accumulation of the *débris* from disintegrated previous rocks which the water had sorted into successive layers, or through the secretive power of certain organisms, such as the minute shells or skeletons of small crustaceæ, etc.

In shape, general distribution, and arrangement both classes differ very widely indeed, and it is absolutely necessary to know at least the rudimentary principles of the natural disposition of these rocks before we can possibly build rocks which should resemble Nature's work. I will, therefore, briefly state the different characters of

these two sections as far as they affect the construction of rock gardens.

IGNEOUS ROCKS

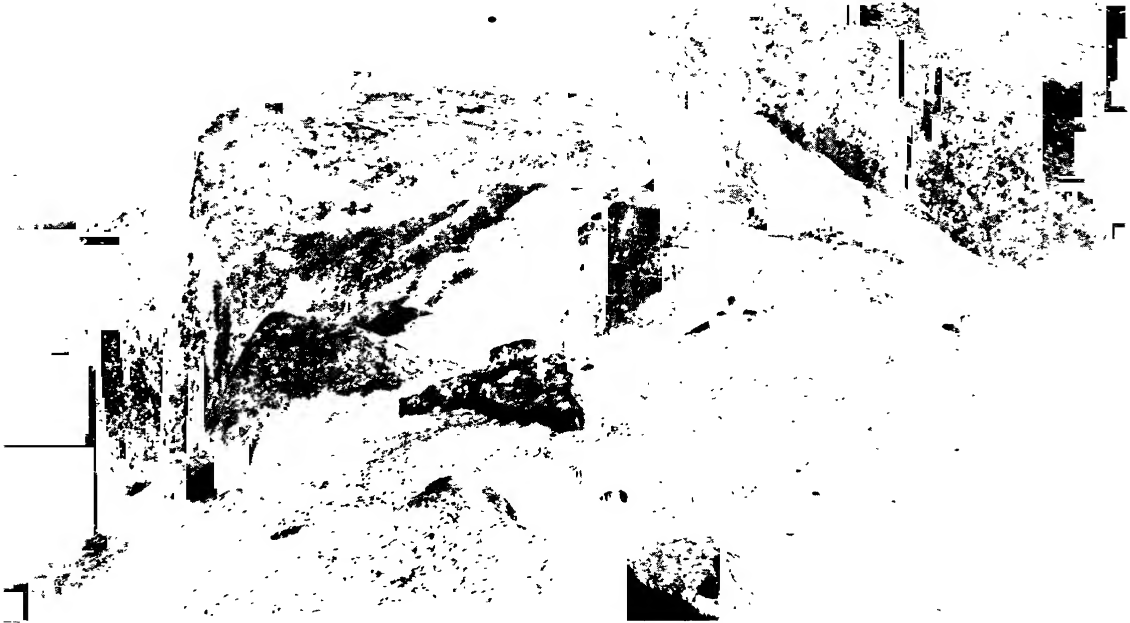
It has already been stated that igneous rocks are considered to have been at some period in a molten condition. They usually consist of several minerals mixed together more or less evenly or scattered throughout a more or less vitreous ground mass. Geologists subdivide the igneous rocks into *plutonic rocks* and *volcanic rocks*. The plutonic rocks are assumed to have been upheaved from the interior of the earth by great heat. During these upheavals the molten masses forced their way through other strata, and when found on the surface they are generally scattered in the wildest profusion. Granite and porphyry are the best examples of plutonic rocks. The second subdivision, *i.e.* the volcanic rocks, are supposed to be the result of volcanic eruptions during bygone ages; to this latter class belong trap, basalt, greenstone, etc.

Of all igneous rocks, the most important for rock building is probably granite. Newly broken in a granite quarry it may not be a desirable material to work with, as there is something cold and unattractive in its even light grey colour which does not lend itself to the making of picturesque

scenery; but the case is altogether different when pieces of granite can be obtained which already have a weather-beaten surface, darkened by ages of exposure and covered with moss and lichen. Such pieces are among the most desirable of all materials for rock building, and on Dartmoor or the moors of Cornwall such boulders may be had in quantity and of all sizes.

Since we have to look to Nature for our teacher, it may be well to take a lesson in arranging granite rocks from Nature's own work. The accompanying illustration was prepared from a photograph which I was allowed to take on St. Michael's Mount, Cornwall, the property of Lord St. Levan. It shows the picturesque beauty and the characteristic disposition of granite rocks towering high above the ground in one place and vanishing abruptly into the ground in another, the rocks forming bold projections and deep recesses sometimes hidden from view by luxuriant vegetation, sometimes just piercing through the carpet of plants, suggesting still bolder and more extended rocks below the surface. The plants in this instance consisted of dense masses of the Sea Pink or Thrift (*Armeria maritima*), unfortunately out of bloom when the photograph was taken, and Sea Campion (*Silene maritima*).

Stratification does not occur in granite, and setting up artificial rocks with blocks of granite



A LESSON FROM NATURE.
GRANITE ROCKS ON ST. MICHAEL'S MOUNT, CORNWALL.

arranged in lines would be absolutely wrong and contrary to Nature; in fact, no rock could be more irregular. Sometimes, it is true, there appear to be lines which do somewhat resemble the strata in sedimentary rocks, but they are merely fissures, caused most probably by contraction during the process of the cooling and consolidating of the originally molten mass.

It will thus be seen that igneous rocks, and granite boulders especially, demand less restriction in their use for the rock garden than stratified rocks, and the rock builder when working with granite boulders has more scope than with most other kinds of stone. Sometimes, when loose stones with an exposed surface cannot be obtained from a moor, it is possible to obtain them from granite quarries; not newly broken stone—which I consider is quite unsuitable—but stones thrown aside as useless, and which have had several years of exposure. In almost every granite quarry unexpected breakages occur from time to time of stones originally raised with a view of being hewn and chiselled into more or less regular shapes, but which by some means or other were spoiled for the original purpose, and being "too ugly for a builder," were thrown aside. I know quarries which during many years of working have amassed great piles of such stones, which have not only an exposed surface but are covered

also with moss or lichen. Such stones would be especially suitable for stepping stones in a bog garden or similar purposes, but also for bold masses of rockwork they are often well adapted.

SEDIMENTARY ROCKS

Totally different from igneous rocks are the sedimentary or stratified rocks, which, as the name implies, were formed under water and were afterwards exposed to view either by the receding of the water or by upheavals from the interior of the earth. All of them show more or less regular lines or strata. Sometimes these lines are broken up by volcanic action or by igneous rocks in a state of fusion having come in contact with them or forced their way through them. In the latter case the strata are often irregularly twisted or show indistinctly, as in some kinds of limestone, slate, etc. Other stratified rocks useful for rock building are various kinds of sandstone, flint, oolite, etc. The stratified rocks also include the so-called *metamorphic rocks*, which have become crystallised, and whose nature has changed owing to contact with igneous rocks in a molten state.

Limestone is the most important of all stratified rocks for rock garden making, and naturally contains more variation, boldness, and picturesqueness than most other stratified rocks. Its colour,

too, is generally such as not to be objectionable, even when fresh from the quarry. A very useful kind of *oolitic limestone* of a dark yellow or light brown colour is found near Bath, where blocks of all sizes are often obtainable. Some of these blocks may be seen in the botanic gardens, Victoria Park, Bath, where a great number were used. Some of these stones are perforated naturally by large holes, forming excellent pockets for plants.

Red sandstone, especially of the "old red sandstone" formation, also is well adapted for rock building, its rich warm colour contrasting effectively with the verdure of the plants.

When stratified rocks are used for the rock garden, it will, of course, be necessary to imitate the natural strata, and for this purpose it will be well to select mostly flat stones of various sizes. Not only will these be found most useful for building apparently large blocks of rock, but they are also useful for a variety of other purposes, such as bridges across a streamlet, rocky steps, or even for forming narrow crevices below the ground surface, to be specially prepared for choice alpine plants.

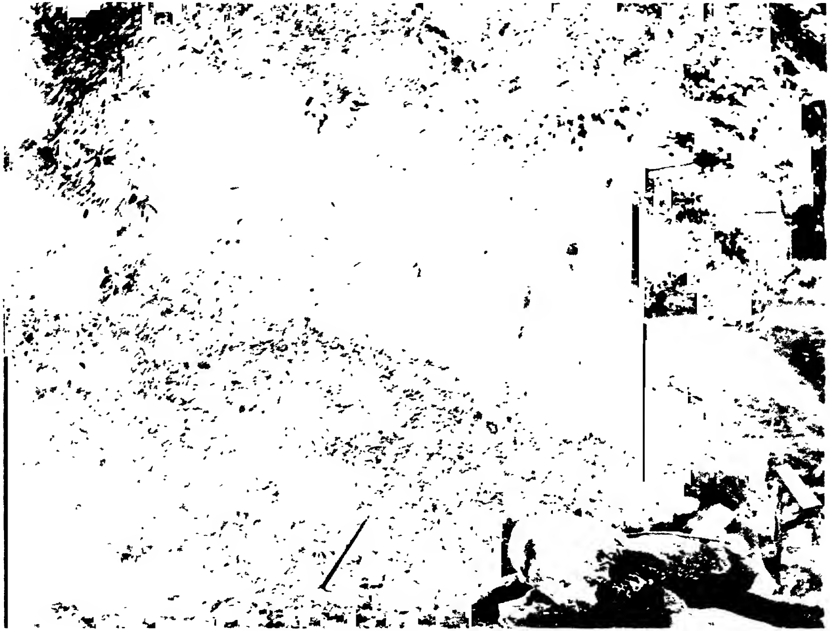
The actual way of building such rocks without making them monotonous will be fully described in subsequent chapters.

CHAPTER IV

PRACTICAL HINTS ON ROCK BUILDING WITH STONES OF THE UNSTRATIFIED CLASS

In the last chapter I discussed the question of which stone to use, and explained the great difference between igneous rocks and sedimentary rocks. I will now proceed to deal with the first of these two classes in a more practical way, with suggestions how to use the igneous rocks in the construction of rock gardens, and by an actual illustration of my own method of dealing with such rocks, giving a series of photographs, all taken during the same week but during different stages of the work.

It has already been stated that igneous rocks, like granite, are not found in successive layers or strata, but occur naturally in the most varying forms. Sometimes they form dense masses, at other times they are loosely scattered in large or small groups, or even as single boulders loose on the ground or cropping up from the surface. In some instances thev bear evidence of secondary



A WEEDY BANK. SITE FOR A SMALL ROCK GARDEN. FIRST DAY.

(*See page* 28.)

upheavals and appear tumbled over each other in the wildest disorder, thus forming large or small caves or deep fissures. Where single stones crop up from the surface it will almost invariably be noticed that the green sward around such a stone appears raised, even if the ground generally should be more or less flat. This is evidence of upheaval from below, and on examination we generally find that such apparently single stones are really only the tops of huge masses of rock below the surface. In imitating nature, when building rocks with stones of the igneous type, it should therefore be our aim to group these rocks as irregularly as possible, and where we put single stones we should raise the ground around them so as to give greater probability to the idea of natural rock having pierced the surface in such a way that only the top is visible while the bulk is hidden below ground. Such imitations of natural rock are not obtrusive but suggestive, and are often more natural and therefore more pleasing in their effect than artificial structures of a much bolder kind.

In the chapter on the sites for a rock garden two illustrations are given, showing the site of a rock garden and the same site twelve months later when the rocks had been completed. This rock garden was on a large scale, and in its construction I used not less than one thousand tons

of stone. There are only few gardens, of course, which would be suitable for a rock garden on such a scale, but by way of contrast I will now illustrate the actual construction of a rock garden within one week only.

A ROCK GARDEN IN A WEEK

Being engaged in the construction of a small rock garden in North Cornwall, I embraced that opportunity of photographing the work during its progress, not with a view of showing my own work as a pattern, but because an example from actual practical work conveys more than many pages of essays and theories. The accompanying four illustrations were prepared from those photographs. There was an interval of only five days between taking the first and the last photograph, and the transformation from the weedy bank represented in the first picture to the finished work shown in the fourth picture was therefore really effected in a trifle less than a week. The material used was about twenty-five tons of granite, gathered on a moor, thus having an ancient appearance and being partly covered with moss and lichen. Picture No. 2 shows the preparatory work. Weeds on the bank were cleared off and everything made irregular by excavating about ten or twelve loads of soil in

ROCK GARDEN MAKING

THE PRINCIPAL STONES PLACED IN POSITION. THIRD AND FOURTH DAYS.

the middle. The reason for this is obvious. Granite cannot make an effective rock garden unless it is arranged quite irregularly. The excavation shown in the picture is really larger than required, so that where the stones are in position a sufficient quantity of soil might be filled in behind the stones to allow small shrubs, alpine plants, etc., to flourish.

Illustration No. 3 shows the principal stones placed in position. It will be observed that they are irregularly grouped, rather massive in the centre, and more scattered towards the end of the little rock garden. Due attention has been paid to the fact that boldness is increased or emphasised by having a projection or promontory immediately adjoining a recess. The recess in the picture appears deeper in reality than is shown by the illustration, which gives the ground foreshortened and apparently flatter than it really is. The bottom of this recess has been fitted with stepping-stones and filled with peat. It is intended for a bog bed for hardy Ladies' Slippers (*Cypripediums*), *Houstonia*, etc.

The fourth picture shows the completed work. On comparing it with the third picture it will be found that only a few stones have been added. Some of the small stones were driven in above and below such plants as were put in sideways. Where two or more large stones join each other

would not only be fascinating and picturesque in the extreme, but which, owing to their simplicity, might easily be imitated or reproduced in gardens—not in every detail, to be sure, but in principle.

When making a rock garden the rocks must not be continuous, but should be irregularly disposed with pieces of green sward or other forms of vegetation intervening between the groups of rock or between singly scattered boulders.

Artificial rock gardens generally err through being too pretentious, too massive, or too continuous. Instead of putting all the stones at our disposal, when constructing rock gardens, into one continuous mass, we should, as Nature teaches us, divide and subdivide them. This will not only enable us to spread them over a much larger area, thus making the rock garden look larger than it really is, but it will give additional charm to our work from the fact that the result will be more in accordance with Nature, and hence more picturesque.

In the picture here given it will be noted that large boulders of rock form the background. In an artifically constructed rock garden such large boulders weighing many tons are seldom available; but we may build—and build successfully—what would appear as large boulders by skilfully combining many small stones in such a way as to

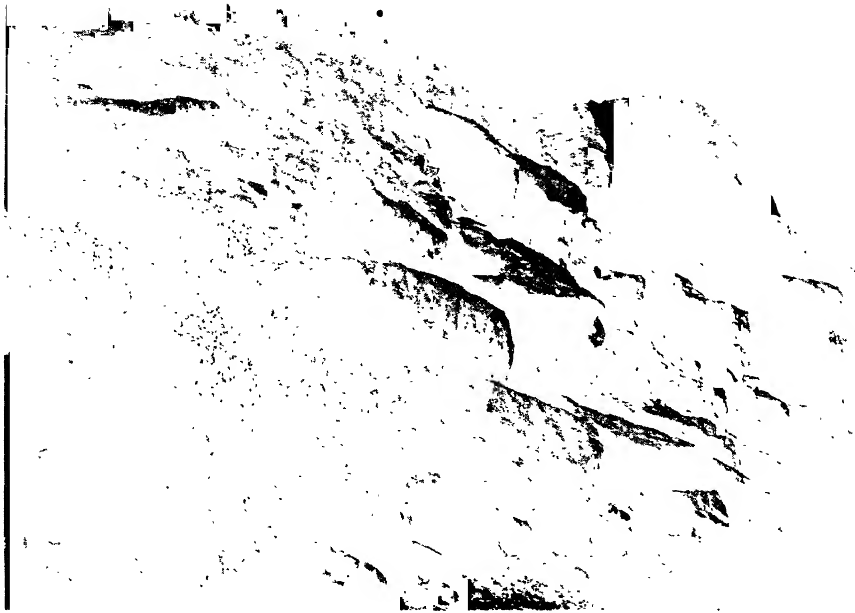
look as though they really formed a huge single block. To accomplish this successfully the stones must be fairly large, and as varied as possible with respect to shape, while as regards colour they should be as nearly as possible of the same hue.

If in joining such stones it is absolutely necessary to use cement, this must be done in such a way that no trace of it can ever be discerned after the work is completed. I find as a rule that, except for the interior of caves or similar places, cement may almost be dispensed with.

If the rocks were built on a solid foundation, and if therefore there is no danger of a settlement which may cause the joints to crack, it might sometimes be advisable, in order to make apparently large blocks of rock, to fill some of the joints with cement coloured to match the stone, but in the great majority of cases small stones and ordinary soil will answer the purpose far better, and if small Sedums, Saxifrages, Thymes, Sempervivums, &c., are put in simultaneously with such small stones and soil, they will soon grow and obliterate every trace of a joint between the stones much more effectually than cement or mortar of any kind.

In looking again at the illustration it will be noticed how exquisitely the stones were grouped by Nature. In the background the rocks boldly

assert themselves. In the centre they form irregular clusters more or less hidden by an intervening carpet of flowers and greenery, while in the foreground they are still more scattered, peeping above the surface only here and there, but indicating or suggesting masses of hidden rock beneath the surface. It is precisely this principle of "suggestion" rather than "obtrusion" which in the making of rock gardens is not practised so much or so advantageously as it might be. Our rock gardens are not sufficiently broken up or varied, and are therefore often not sufficiently natural to ensure that certain indescribable charm which fascinates us when admiring the rocks of Nature. The plants shown in the picture are mostly Statice, Silene, and Armeria.



A NATURAL ROCK GARDEN. (See page 31.)

A ROCK GARDEN AT TRELOYHAN, ST. IVES, CORNWALL. (See page 32.)
JUST AFTER COMPLETION.

CHAPTER VI

PROBLEMS IN ROCK-BUILDING

THE reasons for constructing rock gardens are various, and probably in no two cases quite alike. One lover of plants has become enraptured with the gems of the mountain plants, and desires to found a home in his garden for the flowers he loves; another, perhaps, has a fascination for rock shrubs, and constructs a rock garden specially adapted for showing his favourites to the best advantage; still another is fond of picturesque scenery, and introduces into his garden bold rocks surrounded by broken, irregular ground. But sometimes it may so happen that the ground which is to be laid out as a garden is of so peculiar a nature that its partial transformation into a rock garden is not only the best and most effective way out of a difficulty, but also the most economical. Such is the case here illustrated. The accompanying illustration represents a view in the gardens of Mr. E. Hain, M.P., at Treloyhan, St. Ives, Cornwall.

When the handsome mansion was erected the few acres of ground surrounding it were simply a desolate waste, being, in fact, the site of an ancient mine. There were boulders of granite and "blue elvin" partly scattered over the ground and partly buried under mining *débris*. But apparently the greatest obstacle to the making of a garden was the huge piles of mining rubble from which the ore had been extracted, and which consisted of broken stones averaging about the size of a man's fist. Many thousands of tons of this mining rubbish or waste had been deposited on the ground. The main ridge was about 120 feet long and 20 feet to 25 feet high, forming an angle of 40° to 45°. To cart away this huge mass in order to give the garden the usual orthodox level appearance would have involved an enormous expense without gaining any other effect than that of formality. Why not turn the whole ridge into a rock garden? The suggestion was accepted and carried out. The result is shown by the illustration, which, however, was prepared from a photograph taken some time ago, and now, since the plants have grown up and have hidden some of the defects, the effect is more pleasing and more natural. As in other gardens cases may exist where it might be desirable to treat unsightly ridges of rubbish in a similar way, it may not be amiss to give here a brief description

as to how the transformation was effected in the present case.

As the ridge of small waste stones had been left just as in days gone by the miners had tipped them from their trucks, it was naturally very steep, and on being disturbed this rubble would shift and roll down the steep incline. It was necessary, therefore, to remedy this. In the first place, the rubbish was spread out in some parts while left untouched in others, so as to effect as much variety as possible under the circumstances.

In other portions recesses were dug out in order to increase the irregularity. At the bottom of the steepest parts of the incline a trench was dug out, not straight, but winding in and out, going sometimes above and sometimes below the level of the less steep adjoining ground. This trench proved of the utmost importance. Into it large and small stones were placed, and around and between the stones soil was filled in and firmly rammed. This gave a firm foundation. Without such precaution any stones or soil placed on the steep bank would have been slipping away continually.

In the illustration, on the left side in the foreground, some of these foundation stones, irregularly placed, may be plainly seen. The illustration also shows how the "rocks" are broken up at intervals, leaving between them large and

small spaces covered, not with stones, but with green sward or with various plants. But although on the surface scarcely any stones are visible in such spaces, there had to be a connection underground, especially in the steepest parts, where, starting from the firm foundation above referred to, it was necessary to place stone upon stone for the sake of support in order to allow much larger stones in the higher parts to protrude more prominently. Only when the firm support of such large stones was properly secured could the smaller stones between the bolder groups be covered with soil, &c. Where the rubble had been spread, so as to be less steep, holes were dug out here and there for large single stones and sloping trenches on a higher level, where it was intended to combine the stones into groups to resemble massive rock.

As the stones used for the construction of this rock garden were those found in other parts of the same ground, namely, granite and "blue elvin," which are both of the unstratified kind, anything like regular layers or strata was carefully avoided. In the centre of the picture are some rocky steps, facilitating access from the lower to the higher parts of the ground. But even these steps were kept as irregular as possible, so as to give the idea of naturally scattered pieces of rock rather than that of a staircase. Between

the steps *Thymus* (Thyme) *lanuginosus*, *T. Serpyllum album*, *Veronica* (Speedwell) *rupestris*, *Sedum* (Stonecrop) *spurium*, *Erinus alpinus* and many others have been planted with good effect.

Among rock shrubs which adorn this rock garden may be mentioned many shrubby Veronicas, including *Veronica carnosula* and *V. buxifolia*. These have done remarkably well, as have also the many kinds of Helianthemum or Rock Cistus, for which the comparatively dry exposed slope seems well adapted. *Rhododendron ferrugineum* and *R. hirsutum* have also done fairly well. Of other rock plants which have here given very satisfactory results I may mention various Thrifts, Dianthus (Pink), and *Plumbago Larpentæ*; also Statice, *Artimisia stelleriana* with its long silvery shoots, and the prostrate *Acæna ovalifolia* have formed a dense covering. Of Mesembryanthemum, the quick-growing *M. edule* has covered the bare southern slopes, while *M. uncinatum* adorns the more rocky portions. That this rockery is also full of Arabis, Aubrietias, Alyssum, and other spring flowers goes without saying.

CHAPTER VII

LESSONS FROM NATURE IN ROCK-BUILDING WITH STONES OF THE STRATIFIED KINDS

In the previous chapters on rock garden making the illustrations dealt with the igneous rocks, and depicted not only natural rocks of that class, from which valuable hints from Nature's own work might be obtained, but also various rock gardens artificially constructed. I will now deal with rocks of a totally different kind, viz., the sedimentary or stratified rocks, and their treatment in the rock garden.

Sedimentary or Stratified Rocks

were formed under water. In some cases they consist of the minute shells or skeletons of small organisms; in others they are formed by disintegrated previous rocks, sorted by the water into successive layers. Some of these layers might be fine as dust, while others are of a coarser nature, but as time went on became con-

solidated. But though ages have elapsed since their formation, these distinct layers or strata are more or less plainly discernible in all sedimentary rocks, though not to the same extent. In sandstone, slates, chalk, &c., these lines are very distinct. In limestone, oolite, flint, and others they are more irregular and indistinct.

Now, among some rock-builders a notion seems to prevail that just because originally all such rocks were formed in horizontal layers, the only proper way of imitating them in our gardens would be to place stone upon stone in horizontal or at least parallel lines. I have even seen so-called rockworks built up with small stones and cement or mortar, after which the whole structure was uniformly plastered over with coloured cement, into which (with a trowel) horizontal lines were scratched to represent "strata."

This method of rock-building, in my opinion, is a thing to be avoided. It is monotonous in effect, unpractical to the highest degree, for none of the choicer alpine plants can grow in rocks so constructed, and finally it is extremely ugly. It may be said to be in imitation of Nature. Perhaps so. If we look at the natural rocks where perhaps a railway cutting was made through sedimentary rocks, we may, in certain districts, see miles of such parallel lines of strata, either horizontal or elevated to the same angle throughout. This is

natural, it is true ; but when we imitate Nature in our gardens, why should we choose the ugliest works for our models ? Let us rather select the choicest of scenery. The stratified rocks which we admire most in Nature are not those which show monotonous and even lines all at the same angle of inclination, but the wild and rugged scenes, where massive rocks—no matter how evenly or regularly their successive layers might have been disposed originally—have become disturbed by subterraneous forces which shattered their once regular strata in the wildest profusion.

We admire the rocks which during violent convulsions or upheavals were cleft asunder, or which, when the water under which they were formed receded, toppled over each other in the greatest disorder. We admire rocks which by the mysterious forces of Nature have been broken up, and which have been disturbed into groups of varying shapes and sizes, sometimes massive or pierced by caves and ravines, sometimes scattered, or vanishing altogether below the surface of the sward and reappearing farther away amongst a mass of vegetation, either flowers or greenery.

Such are the stratified rocks with which Nature has provided her most charming pictures. Such should be our models. Our illustration from Nature's own handiwork is prepared from a photograph which, by the courtesy of Mr. Ford, I was

allowed to take in that gentleman's garden at Lynmouth (North Devon).

The magnificent rocks and charming picturesque scenery of Lynton and Lynmouth have a world-wide reputation. But their wild grandeur generally is beyond anything which might be successfully introduced into a garden. The illustration, however, shows an exceptional case, viz., an absolutely natural rock garden, whose owner is an enthusiastic admirer of mountain plants, and alpine plants in particular.

The picture shows plainly what a wild and rugged appearance Nature can impart even to rocks which were originally regularly stratified. The rocks consist of the rugged Devonian slaty grit known as "bastard shale." The rocks shown in the illustration were not rearranged by man, but were left untouched in all their wild glory as their owner found them, and a glance at the picture will show how terrific must have been the natural forces which had split the rocks into boulders and groups of boulders of all shapes and sizes and of every conceivable angle of elevation.

But, in spite of this apparent chaos, it will be observed, even in the illustration, that each section shows distinctly its stratified character. Not only the massive rocks in the background, but also each group, and even each boulder, show parallel layers. But though these strata in each individual group

may be parallel, they are anything but parallel collectively. In one group they may be running from north to south, in another from east to west. In one they may be horizontal, in another at an angle of 45°, and so on. Even the illustration shows that wherever a sudden change occurs in the direction of the strata there it is distinctly seen that such rocks or boulders or groups of rocks have no connection with each other, but were severed from the adjoining block.

It may be only a narrow fissure which intervenes, or it may be a broad gap, a cave, or a patch of green sward studded with plants, but, whatever the cause of the divergence in the strata may be, the separation will be plainly visible. This, then, is the lesson Nature teaches, and this should be our keynote for arranging in a picturesque manner such rock gardens as are to be constructed with stones of the stratified kind. When we

Arrange Artificial Rocks

let us have no continuous masses, but break them up into groups of varying sizes, some large and bold, others small and scattered and gradually vanishing towards the outskirts. Let us introduce between the groups of stones places of various sizes on which suitable plants can grow. Let the scene appear as if an earthquake had been at

work among the regular strata of the rocks, cleaving and scattering them in all directions. By all means let us have stratification more or less distinct, according to the kind of sedimentary stone used ; but though this stratification should be more or less parallel in each individual group, let us have no two adjoining groups at the same angle. Above all, wherever an alteration in the angle of the strata is to occur, give a reason for it by plainly showing a separation from the adjacent block.

It must not be thought that I am presumptuous enough to desire to lay down the law. This is Nature's own law, and a careful study of the natural rocks depicted in the illustration will prove my argument.

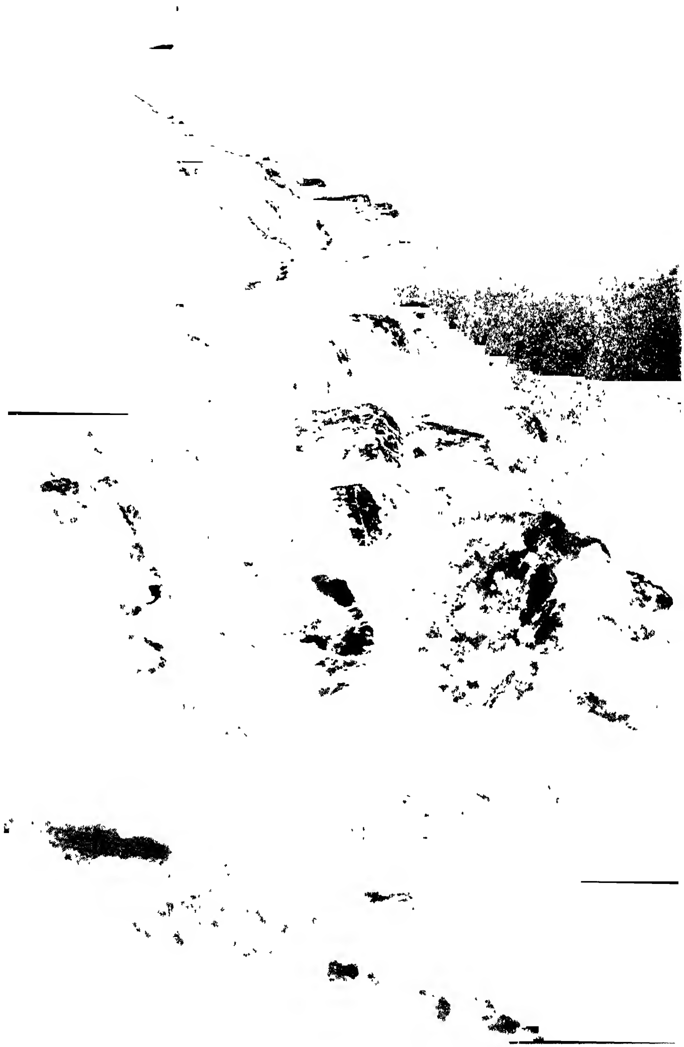
In a later chapter the actual construction of rock gardens arranged on the principle referred to above is illustrated in a practical manner.

CHAPTER VIII

PRACTICAL HINTS ON THE CONSTRUCTION OF STRATIFIED ROCKS

I HAVE dealt with stratified rocks and their disposition, giving an illustration of natural rocks which, though stratified, were so broken up as to almost resemble the rugged character of igneous rocks were it not for the fact that each block or each group shows parallel layers distinctly, although at an angle quite different from that of any adjacent group. I have tried to upset the theory that stratified rocks artifically constructed should show parallel "strata" at the same angle throughout the work, and I suggested that stratified rocks to be picturesque should have the appearance as if an earthquake had been at work among the regular strata. As a model I must refer to the picture of Nature's own work.

In the last chapter the work of Nature was described and the lessons to be gleaned therefrom pointed out. I will now turn to the practical side of the question, and will consider how these lessons



NATURAL STRATIFIED ROCKS AT LYNMOUTH.

(*See page* 42.)

maybe applied to the construction of rock gardens. As practice is better than theory, I will give an example in the shape of the accompanying illustration. I do not for one moment wish to point to this as a model (for models we must look to Nature), but I give it because it shows in a practical way what would otherwise require several pages of explanation.

The present illustration represents a small rock garden at Liskeard, and is the property of Mr. L. C. Foster. Facing the front door of the house a deep slope presented itself, and as the ground adjoining this had been kept in the irregular style, the site was suitable for a rock garden; in fact, no other treatment would have fitted in quite so well. For grass the slope would have been too steep, and a wall would have been too formal under the circumstances. The geological formation of the neighbourhood, like that of the natural rocks illustrated in the last chapter, belongs to the "Devonian" order, and stone in sufficient quantity was easily obtained close by in the shape of fairly regular blocks of "schist" and "shale."

The Site required Preparation.

Near the centre a cave was contemplated, which required deep excavation. A bog garden, too, was to be included, and, last but not least, special

places for choice alpines had to be prepared. The decomposed soft shale or shellett which formed the subsoil was not entirely carted away, but a portion of it was mixed with leaf-soil, loam, and stone chippings, and thus mixed it was used for the planting of many alpines. Peat was added for such plants as required it. In arranging the stones I made it a practice to begin at the lowest level farthest away from the point from which the principal view is to be obtained. When building rocks on that principle it is far easier to judge the effect of this recess or that projection. When space is limited it seems difficult sometimes to get sufficient boldness into work of this kind, but this is facilitated by letting recesses and projections adjoin and emphasise each other by way of contrast. It is surprising how bold even a very small projection will appear if contrasted against a dark recess of which some portions are partly hidden from view. The fact of some parts of a rock garden being hidden from view will make it appear larger than it really is, because the observer will invariably give an imaginary extent to the hidden parts. For this reason the little cave seen in the picture was so constructed that its depths cannot be ascertained from a distance. The exterior blocks forming the mouth or roof of the cave were fixed in such a position as to appear as if they had naturally tumbled together, and it will be observed that

the " strata " on each side are in direct juxtaposition.

When imitating natural strata calculated for distant effect, it will, as a rule, be found most practical to place flat stones together in successive layers, taking care to spread a thin coat of soil on each flat stone before the next one is bedded. But unless the stones are tilted with a downward slant, the narrow crevices thus left between the stones will be suitable only for plants that would be content with little moisture.

For Choice Alpine Plants

that require almost vertical deep and narrow fissures it would be best not to bed the stones on their flat sides at all, but insert them into the ground on their edges in such a way as to be not only perfectly firm, but also to furnish precisely the conditions best suited to the choicest alpines. Sometimes this can be done in a way suggestive of almost horizontal or but slightly inclined strata, although (for the sake of the plants) the stones may be really vertical. As a case in point I would refer again to the illustration. The stones in the foreground on the right have the angular edges more or less parallel with the " strata " of the higher portions in the background, and might appear as having the same angle of stratification,

but as a matter of fact they are fixed vertically, and the picture shows how well the plants are thriving in consequence.

I will now briefly deal with a few other points in the illustration. Near the centre, it will be observed, is a rough kind of pathway, partly formed with flat stones.

This is a bog-bed, and the stones are stepping-stones facilitating access. Only a portion of this bog-bed is visible from the point from which I took the photograph; the other part recedes behind the more prominent rocks, which latter form shady nooks for hardy Cypripediums, *Polygala chamæbuxus*, and other good things. Various Gentians are flourishing, including until recently *Gentiana bavarica*. The latter did well for a year or two, but has now succumbed. Special corners were reserved for such gems as *Campanula Zoysii*, *Edraianthus serpyllifolius*, and various choice Androsaces and Dianthus. Of other small rock plants used I may mention *Campanula turbinata*, *Saxifraga longifolia*, *S. Rhei*, *S. lantoscana superba*, *Sedum spathulifolium*, Edelweiss. The dry ledges just outside the little cave were chiefly devoted to Sempervivum and similar plants, while Ramondias and other shade-loving plants clothe the fissures to which more moisture can have access.

The expanded star-shaped flower almost in the

centre of the picture is *Carlina acaulus* (Charlemagne's Thistle). Immediately above is a rocky ledge devoted to a group of alpine Rhododendrons, viz., *R. ferrugineum* and *R. hirsutum* in various forms. To the right of this will be seen a mass of Helianthemum, and below the latter a fine group of the bold Megasea. The top ledge on the right shows a batch of *Genista præcox*, and on the left a mass of *Zauschneria californica*. Between the cave and the ledge of Rhododendrons above referred to are some rocky steps leading from the bog-bed to a path on the higher level, but in the illustration this is not visible. The steps were clothed with *Thymus lanuginosus*, *Acæna microphylla*, *Veronica repens*, *Arenaria balearica*, &c.

The construction of the rock garden took scarcely two weeks, and the photograph was taken about twelve months after completion. In subsequent chapters I hope to give illustrations of various other styles of rock gardens.

CHAPTER IX

MORE PRACTICAL HINTS ON CONSTRUCTING STRATIFIED ROCKS

I HAVE given an example of a small rock garden constructed of stones belonging to the "Devonian" group. I will now give an illustration of rocks built entirely with stones of the carboniferous period, viz., limestone. All limestone is, of course, sedimentary rock, but in its stratification it is irregular. This is partly owing to mechanical force, such as upheavals, and partly to the chemical action of water, which, in passing through the rocks for countless ages, has dissolved a considerable portion of the calcic carbonate, often leaving large hollows or caves. Sometimes these caves are formed by the toppling over of large masses of rock previously undermined by the action of the water.

Owing to these various causes, irregularity in the strata of natural limestone rock is always more or less apparent. We may see in one place strata of absolute regularity, in another layers of rock

ROCK GARDEN AT WELLINGTON, SOMERSET,
SHOWING GENERAL ARRANGEMENT

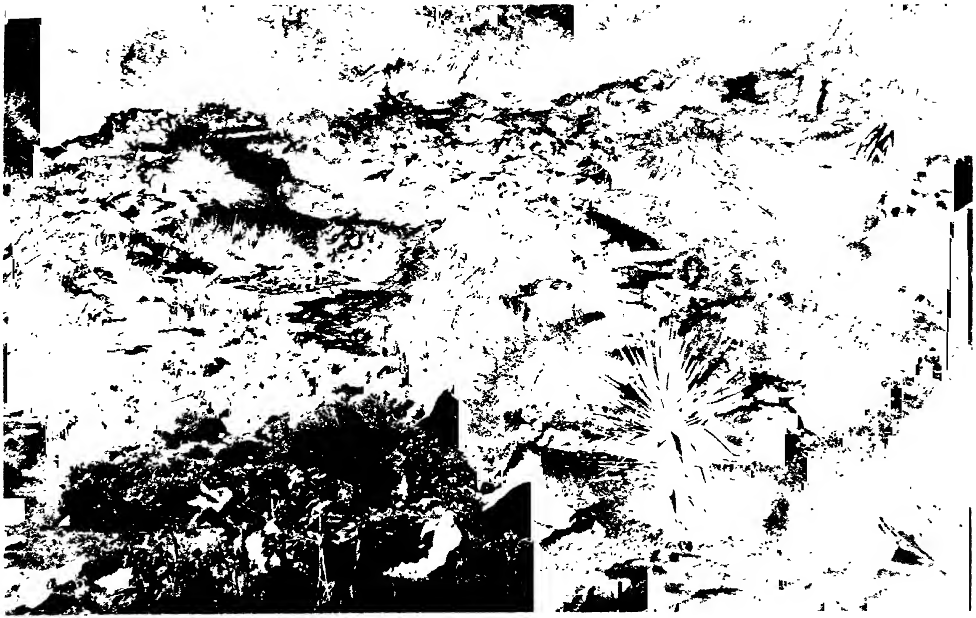
that have become dislodged and run in irregular lines, while in others no lines can be recognised at all. When imitating Nature in a small way by the construction of a rock garden, we will do well, therefore, to bear these facts in mind.

Photographs and illustrations of rock gardens which have been planted for a year or two may sometimes show pretty and natural effects, but since the stones are partly hidden by the plants, it is next to impossible to glean from such a picture how the former were actually placed. But, since this is of the utmost importance in rock building, I venture here to introduce two views showing a rock garden photographed during its actual construction before any plants were put in, and again immediately after the planting was completed, but of course before the plants had time to start into growth. From a picturesque point such views, showing practically nothing but bare stones, are of course a failure, but they reveal at a glance how the work was done. That even the picture which shows the planting completed does still look too bare to be effective I most readily admit, but it shows how the stones were placed and where the plants were put, and that is the object of the illustration. I will now give a short description of the work illustrated.

CHAPTER X

GENERAL HINTS ON GROUPING ROCKS

I NOW give an illustration of a rock garden photographed a few years after completion, when the plants had attained a considerable size. Effect in the rock garden will depend neither on the stones nor the plants alone, but must be a fitting combination of both. Few people looking at the little scene here depicted would imagine that this was once an ordinary flat meadow. Yet such is the case. The picture represents a small portion of the rock garden of the late Mr. E. Fisher, at Abbotsbury, Newton Abbot. I constructed the rock garden some years ago, when, in order to obtain the necessary irregularity, the soil had to be excavated about thirteen feet deep, and the extra material thus gained was used for filling up in other places. In this way an almost level piece of ground was made undulating. I have previously maintained that, whether large or small, the rocks should not be continuous, but should be broken up, and the accompanying reproduction



PORTION OF ROCK GARDEN AT ABBOTSBURY.

will give a practical illustration of this. Although the picture shows only a small portion of this comparatively large rock garden, it will serve the purpose of explaining my meaning. If rocks are constructed in a too continuous way, the work must of necessity be too stony to be picturesque, and would be more like a quarry than a rock garden. I consider that every rock garden, no matter whether it is large or small, should have a sort of nucleus of rocks more massive than the rest. If this can be displayed against a fitting background, such as a clump of Fir trees (in the distance), a bank of Ferns or groups of rock shrubs, the effect would be greatly enhanced. The most difficult part of such an arrangement, and the one requiring the greatest skill in constructing, is to show an apparent reason for such rocks coming, as it were, to a sudden stop. This I find is best effected by giving them the appearance of diving down far below the surface and cropping up again at some distance from the central massive portion. This may be repeated again and again until towards the outskirts of the rock garden the groups of rock above ground would be but loosely scattered fragments, cropping up from the ground here and there. But if skilfully arranged these fragments will nevertheless convey the idea of the rocks being really continuous below the surface, and having an under-

ground connection with the more massive rocks referred to.

The illustration will further explain this. To the right in the picture the rocks are massive; the little chair marks the entrance to a cave, while in the background a waterfall and streamlet (only partly visible) traverse the rocks. Then comes a sudden stop. The strata of the rock (limestone) are lost from view and dip below the ground where in the picture the path and stepping-stone bridge may be seen. To the right of this path, in the background, the rock reappears in the form of an isolated smaller group of rocks completely surrounded by green sward, which latter serves the purpose of a path and facilitates access to plants, &c. This group of rocks was devoted chiefly to alpine Poppies and Campanulas of various kinds. On the left of this group, and on the other side of the path, is a still smaller group, in which not stones but plants predominate. The plants in this case are various kinds of Heather, through which the rocks show only here and there. To the left of this batch of Heather (still in the background of the picture) will be noticed an irregular grass path, which divides the Heather group from a more prominent rocky group devoted entirely to Androsaces and other minute gems of the mountain flora, and forming, in fact, the "select part" of this rock garden,

which cannot be overrun by plants of coarser growth.

Right in the centre of the illustration the interruption between the rocks is effected by plants of a bold type, such as *Spiræa gigantea* (syn. kamtschatica), and various grasses and Scirpus which fringe the pond. The other plants noticeable around the pond are *Saxifraga peltata*, various Iris, and in the foreground *Dryas octopetala*. As only a very small portion of the pond appears in the picture, there seems to be, to judge from the illustration only, a continuous fringe of plants around the water; but this is not so, and would, in fact, have been a very grave mistake. I hold that occasionally the fringe of plants or rocks should be broken by grass dipping right into the water. I will say more on this subject when dealing with water in the rock garden.

The plants in the foreground of the illustration are on a much higher level than the path behind them, but as they were photographed from above, the ground appears fore-shortened. In planning the various groups of rocks care should, of course, be taken to make each individual group pretty and natural in appearance, to vary those groups, not only in size and shape, but also in the manner of planting them, and, finally, to take care that all these groups form a pleasing picture.

CHAPTER XI

ROCK-BUILDING ON ABRUPTLY SLOPING GROUND

THE greater portion of the examples of rock-building given in the previous chapters dealt with work on more or less level sites. In several cases the necessary undulation of the ground had to be produced by excavating soil in one portion of the rock garden and filling it up in another. I will now give an illustration of rocks built on abruptly sloping ground and my method of dealing with them.

When a house is built on the side of a hill deep excavations are always necessary to gain a level spot large enough to build the house upon. This, of course, necessitates a steep slope on one side of the house. If the slope of the hill was fairly steep before, it must be much more so after the level space on which the house is to stand has been provided. Sometimes it might be so arranged that only the less important windows face the part which has been deeply excavated, and in that case the building of a plain wall is generally

the most practical way of dealing with the question. But when an abrupt slope or a very steep bank is rather close to and in full sight of the most important windows of the house, it becomes absolutely necessary to devise a form of treatment which would be ornamental as well as useful. Without a substantial support of some kind such a steep bank would be continually crumbling away. If the immediate surroundings of a house so placed are in the geometrical style, a wall garden might be a good way out of the difficulty, but when the surroundings are wild and undulating a rock garden would be about the only means of supplying the necessary support to the bank and forming an ornamental feature in the landscape as well.

As a general rule, a rock garden too near a house would not be a great success, from the fact that its irregular lines cannot well be made to harmonise with the geometrical outlines of the building, &c., but a case such as described above would be an exception to that rule. In order to give a practical example I would refer to the accompanying illustration, prepared from a photograph taken in Mr. T. B. Bolitho's beautiful grounds on the banks of the river Dart.

In this charming residence the drawing-room windows command a picturesque view of exquisite woodland and river scenery, but the dining-room

windows look out upon a very steep slope scarcely fifty feet away. As the ground is naturally rocky in the immediate neighbourhood, it was quite in keeping to treat this steep slope as a rock garden. At first the experiment was tried of having merely grassy banks, relieved here and there by planting; but the grass on so steep a place was most difficult to cut, and was, moreover, liable to be burnt up by a scorching sun. The rock garden, however, proved a complete success: it supports the bank, which formerly used to crumble away, and it has almost entirely done away with the necessity of cutting the grass. Finally, it looks bright and cheerful almost all the year.

When building rocks against a slope varying from 45° to 65° in steepness, there is a danger of making the work too straight—too much like a wall, in fact. For producing irregularity on such a site there is no better way than that of cutting deeply into the hill in various places and producing small caves or deep recesses of varying depths, shapes, and sizes. The irregularity thus produced will be greatly emphasised by letting such recesses be adjacent to projecting rocks. A portion of the Greenway rock garden showing this particular effect is noticeable in the illustration. The rocky projection on the left has the effect of making the little cave in the background appear much deeper than it really is. It will be

noticed that in the background the rocks are piled up in almost horizontal strata, while the projecting rock in the foreground shows almost vertical stratification. The idea sought to convey is that these rocks formed a solid mass at some remote period, but were separated and became pierced with the cave referred to during violent convulsions caused by earthquake.

The low portions in the foreground of the picture are devoted almost entirely to the smallest and choicest alpine plants, while in the background, where the rocks are bolder, the plants also are of a bolder character. They include specimens of Yuccas, *Dracæna indivisa*, *Polygonum vaccinifolium*, *Veronica buxifolia*, *Saxifraga cordifolia*, *Ramondia pyrenaica*, *Horminum pyrenaicum*, *Haberlea rhodopensis*, *Mesembryanthemum edule*, Helianthemums, &c., and in the foreground *Gentiana verna*, several Androsaces, *Geranium argenteum*, *Saxifraga Grisebachii*, *S. longifolia*, and many other good things.

I would call attention to the fact that, although these rocks were built on very steep ground, they are nevertheless well broken up and interspersed with grass paths and rocky steps, affording an easy means of access to all parts of the rock garden.

CHAPTER XII

ROCKS ON A LARGE SCALE.

I HAVE pointed out in the previous pages what I consider the most effective way of dealing with rocks built on abruptly sloping ground. The illustration there given showed a portion of some completed work on rather a small scale. I will now briefly consider the construction of rocks on a larger scale under similar circumstances, *i.e.*, on a slope more or less abrupt, and by way of illustration I have photographed a portion of Mr. P. Singer's rock garden at Paignton.

If even in small rock gardens it is necessary for the sake of picturesque effect to have the rocks not too continuous, but well broken up, this becomes still more important in the case of a rock garden on a large scale.

BOLD EFFECTS IN A LARGE ROCK GARDEN

are essential. To produce them we must provide a series of absolutely distinct features, which,

however, should be so grouped as to be harmonious when seen as a whole. The rocks, for instance, in one place may appear very bold and massive and almost bare of vegetation, whilst in another the plants may appear thinly scattered or crowded together in masses. Rocky projections might vary with deep recesses or caves, or solid rocks with scattered fragments, and here and there grassy banks or a trickling stream might still further vary the scene. A series of different pictures welded into one is perhaps the best definition of what a large rock garden should be.

Not only should the features of such a rock garden vary as much as possible, but there must also be different modes of access. We may, of course, have a comfortable main gravel walk winding through the rocks, and branching off from this we may have a few smaller paths winding still more, but to make every part of the rocks accessible by means of such paths would be a great mistake. There would have to be too many paths, and these would detract from a natural appearance. On the other hand, it is most desirable that a rock garden should be so arranged that every plant can easily be reached, but this can be done without formal paths. One of the easiest and at the same time most natural ways of accomplishing this is by means of irregularly

connected patches of grass between the groups of rock or by stepping-stones protruding irregularly from a carpet of flowers and greenery. On sloping ground a dried-up streamlet forms a most convenient mode of access, as it can be made to appear most natural. I will have more to say about the construction of this. But on abruptly sloping ground the most convenient and practical method of communication between the highest and the lowest parts is

By Means of Steps.

Steps which are in direct continuance of a path might be made perfectly regular, either of wooden slabs or stones—preferably the latter—because they would be permanent and not liable to decay. Among the irregular portions of a rock garden rocky steps are more convenient and picturesque. Rocky steps should be a comfortable staircase without in the least looking like one. Such rocky steps are plainly shown in the accompanying illustration of the rock garden at Oldway, Paignton. Though easily ascended, these steps are at the same time very irregular, and form, as it were, part of the rocks themselves. In making them, care was taken to furnish them with suitable plants, so arranged that they would partly clothe the rocks without impeding access. Admirably

adapted for such a purpose are plants like *Veronica repens*, *Thymus lanuginosus*, *Arenaria balearica*, *Veronica alpina*, and others of a similar nature.

In this rock garden the rocks are irregularly stratified, consisting, in fact, of limestone. On the left, in the background of the picture, will be seen a cave formed by what appears to be massive rocks, from which descends a small stream of water feeding a Lily pool and a bog-bed in the foreground. The surface of these rocks is not plastered in any way, but shows actually the natural stone itself. The boulders forming the cave have the appearance of blocks of stone weighing fifty tons or more. In reality few of the stones weigh more than one ton, but these are joined together in such a way that they appear united. Most of the large rocks so constructed have their interior filled with soil for plants. The cave shown is a roomy one, and will form a cool retreat during hot weather. It is approached on one side through a cleft in the rock, and on the other by means of stepping-stones below the waterfall.

During the construction of this rock garden care was taken to group the plants in such a way that distinct features were produced. Small rocky beds were reserved exclusively for small alpines of the choicer kinds; in other portions were grouped colonies of Opuntias, Aloes, &c., while

rock shrubs in great variety adorn the bolder and more massive rocks. In the construction considerably over one thousand tons of stone were used, and the picture shows only a portion of the work.

CHAPTER XIII

SMALL ROCK BEDS ON FLAT GROUND

AMONG owners of gardens there are, comparatively speaking, few who would find it expedient to construct a rock garden on a scale as large as that illustrated in the previous chapter. There are many, however, who, though possessing a garden of only small dimensions, are nevertheless desirous of adorning the same by some modest and simple arrangement of rocks and mountain plants. For such, a rock bed or two will often supply all that is needed, and these, besides being a great source of pleasure to their owner, may also be a great ornament to the garden generally. A rock bed of this kind is illustrated. It was constructed a few years ago at the Manor House, Dawlish, the property of Miss Jackson. Although in this case the rock bed in question forms only the forerunner, so to speak, of larger and more elaborate work only a little way off, it is also at the same time complete in itself, and might serve the purpose of illustrating a small rock bed on flat level ground.

Seen from the particular point from which I took the photograph, the view is foreshortened and the bed appears long and narrow, while in reality its width and length are approximately equal. It will be observed that it has no clearly defined margin, but that the lawn and the plants in the bed amalgamate without any formal dividing line. Plants of all kinds cover the bottoms of the stones, which being thus partly hidden from view, convey the idea of being the tops of really large rocks receding below the surface of the ground. It is surprising how fine an effect can be easily produced by stones cropping in this apparently natural way through a plant-covered surface. Such a bed would not even look out of place on perfectly flat ground, provided its surroundings are also kept irregular.

Details of Construction

As the rock bed is rather low on the whole, it was necessary to prepare the ground at some depth below the surface. The ordinary method of trenching would be useless in this case, as the soil would afterwards settle too much. As there would thus be a danger of stones and plants becoming dislodged, greatly to their disadvantage, instead of trenching, excavation was resorted to, and the soil of the whole bed was removed to a

depth of about two feet. Since it is a mistake to build rocks on the top of loose soil, the building was commenced on the solid ground after excavation. The height of the rock bed varied from two feet or three feet above the original surface to a foot or eighteen inches below it. Where, therefore, the rocks would be buried inferior stones were used, but were so placed that, while forming a solid foundation for the rocks above them, there would be narrow crevices between them filled with soil for alpine plants. The best of the earth previously removed was mixed with small broken stones and a little leaf-mould, and was then put back between the stones and firmly rammed. This ramming is especially necessary in the case of narrow crevices destined to become the home of alpine plants. It will be seen that by using this method the depth of soil in the rock bed would vary considerably; in the raised portions it would be four feet or more, while some of the low portions would have little more than six inches of soil in them.

In Planting such a Rock Bed

as the one described, care must of course be taken not to destroy its irregular character by unsuitable planting. As a general rule it will be found advisable to plant the highest and most prominent portions

of such a bed with plants of a bold type, and clothing the low lying parts with the dwarfest kind of vegetation only. By this means the contrast is emphasised and the little rocks look more effective. A glance at the picture will reveal that this principle was practised in the bed here illustrated. Here the most prominent parts were adorned with Dalmatian toadflax (*Linaria dalmatica*), *Yucca recurva*, and Great Thrift (*Armeria cephalotes*), while the lowest parts in the central part of the bed (not visible in the picture) were clothed with a carpet of *Herniaria glabra*, *Veronica rupestris*, *Pratia angulata*, *Gentiana verna*, *G. acaulis*, and other very dwarf plants. In the foreground on the right may be seen a group of Edelweiss cropping up between half-hidden stones.

Among other plants used for this rock bed were *Acantholimon glumaceum*, *Dianthus alpinus*, *D. neglectus*, *Morisia hypogæa*, *Ramondia pyrenaica*, *Saxifraga longifolia*, *S. oppositifolia*, *S. burseriana*, &c.

In making rocky beds of this kind the great aim should be simplicity and, above all, natural appearance. When well carried out small beds such as the one described may often be more pleasing in effect than more elaborate structures.

CHAPTER XIV

ROCK-BUILDING WITH REGARD TO THE PLANTS TO BE GROWN.

I WILL deal briefly with another most important subject, namely, the construction of rocks with regard to the plants that are to adorn them. It cannot be denied that, however effectively the rocks may be arranged, their beauty can easily be marred or enhanced by the subsequent position of the plants. It is for this reason that "masonry" rock gardens are always a failure. Whoever designs and arranges the rocks is the proper person to direct the planting also. More than this, even during the construction of the various rock-beds which compose the rock garden it is absolutely necessary for the designer to have a clear idea of what kinds of plants will give the best effects for the various parts of the work. I have pointed out in a previous chapter that in rock-building much effect can naturally be produced by way of contrast. A projection adjoining a deep recess will emphasise the latter, for the same

reason as a high point will be emphasised by an adjoining depression. But supposing after the completion of the work the planting is entrusted to unskilled hands and without regard to artistic effect, the probability would be that the recesses and depressions alike would be filled up with plants that grow to a considerable size, and small plants would be used for high points and projections; in other words, the bold effect originally intended would be utterly ruined by a mode of planting which has decreased instead of increased the intended contrast. As a rough kind of guide (liable to exceptions) it may, therefore, be suggested that tall or vigorous-growing plants should adorn the highest and most prominent parts of the rock garden, while the lowest and receding parts should be furnished with plants only a few inches in height, which by forming a carpet between the higher rocks would emphasise the bold effect; while for the boldest parts of the rock garden bold plants and even rock shrubs might be most suitable. There would be no class of plants so well adapted for the lowest parts of the work as alpine plants.

The Requirements of Alpine Plants

By alpine plant in the general sense of the word is meant dwarf mountain plants from various parts

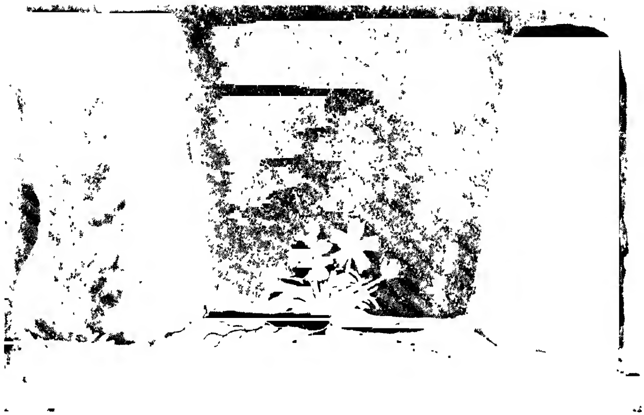
of the world. While the majority of them, perhaps, have their native home in the Alps of Southern Europe, others of equal beauty and of easy culture have found their way to the British Isles from the Himalayas, from China and Japan, and even from the Rocky Mountains and other portions of America.

Alpine Flowers at Home

Before considering the best ways and means of cultivating these plants in our rock gardens, we shall do well to study them in their native home, say, for choice, in the Alps of Switzerland. Who among the travellers in that charming country has not been struck by the abundance of alpine flowers and their glorious colours? Who has not admired the dense cushions of stunted foliage bedecked, as with jewels, by exquisite flowers in the greatest profusion, and often in places where growth of any kind would seem almost impossible owing to scarcity of soil and intense cold. But alpine plants differ from most other plants, and in the course of ages they have adapted themselves to the peculiar circumstances of their surroundings. In high altitudes they have to withstand a broiling sun, while their roots are down ever so far in narrow chinks and fissures, where the scanty food they find would be cool and moist. Even during

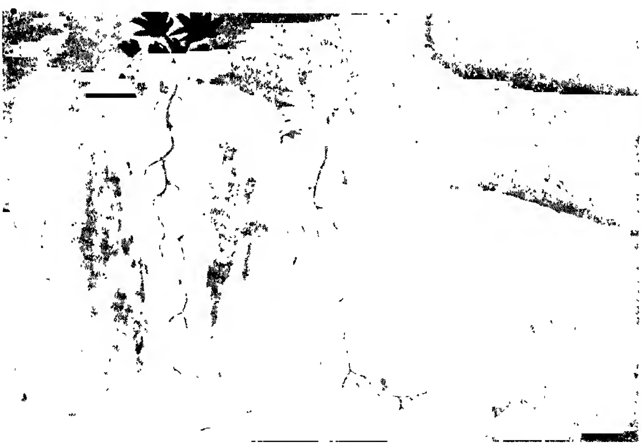
the height of summer their interesting foliage is frozen stiff every night, and what little growth takes place has to be accomplished during a few hours at midday. The expansion and contraction of the cells of such plants during day and night must be enormous, and enough to tear the tissues of ordinary plants. But these sturdy mountain gems are specially constructed to meet all emergencies; their cells are small and their cell-walls are abnormally thick. This accounts for the toughness of the tissues. For six or eight months during the year they are under a covering of snow, and when in spring the balmy southerly winds, known as the "Föhn," melt and disperse the snow, the alpine flora awakes from its winter rest as if by magic. In an incredibly short space of time all is life and beauty, till in October the snow again provides a protecting covering for the tiny gems.

Such is the life of alpine plants at home. They enjoy an abundance of the purest possible light, and though they may be short in stature, their roots, in order to find the nourishment required, have been compelled to penetrate deeply into the narrow crevices of the rock, and it is not at all unusual to find that plants only one inch or two inches in height send their roots to a depth of several feet.



WRONG WAY OF PLANTING ALPINES.

[*N.B.—The roots are able to spread too close to the surface, and would be soon affected by too much drought or too much moisture.*]



THE RIGHT WAY OF PLANTING ALPINES.

[*N.B.—The roots cannot spread close to the surface, but are compelled to go down to a considerable depth, where the soil is cool and moist.*]

ALPINE PLANTS PLANTED SIDEWAYS
INTO AN UPRIGHT FISSURE.

Culture of Alpine Plants

In order to apply the lessons we are taught by Nature with regard to alpine plants, I have sought to further illustrate my meaning by the accompanying sketches bearing on the planting of alpine plants in the rock garden. Diagram No. 1 shows the wrong way of planting. In this sketch it is assumed that the plant has been put in like an ordinary bedding plant (as is so often done) between upright stones some distance apart. Now what must be the consequence of such planting? The stones would exclude light and air, which are essential to the well-being of the plant; but, worst of all, an alpine plant planted in the manner indicated by the sketch would spread its roots close to the surface of the soil, where—since a natural covering of snow cannot be depended upon—the slightest excess of moisture or an excess of drought would be fatal to its existence.

In sketch No. 2 I have tried to represent the right method of planting alpines, viz., in a deep, funnel-shaped, narrow fissure between stones let deeply into the ground. These crevices are filled with soil and small stones in such a manner as to constitute a number of miniature earthy channels, through which the roots can penetrate to a medium of richer soil at the bottom, and to such a depth

that drought or excessive moisture would leave them equally unaffected. It must not be supposed that such structures of rocks prepared specially for choice alpine plants need present an unsightly or unnatural appearance externally. On the contrary, with a little thought and skill the useful and the ornamental may be combined in such a way that the newly constructed rocks present a picturesque and natural appearance, and yet answer all the requirements of the choicest alpines. Sketch No. 3 shows how a narrow, upright fissure among rocks might be adorned by putting in, sideways, a number of plants which prefer such a position. The actual planting operation will be described in a later chapter.

CHAPTER XV

STABILITY

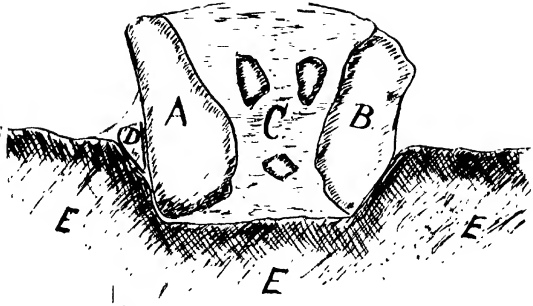
The previous chapters on rock gardening dealt exclusively with the arrangement of rocks for general effect. The most important consideration of all must be the construction of rocks with regard to the requirements of the plants that are to be grown on them. But before entering fully into this matter I will briefly consider yet another important factor, namely, stability. Soil and stones newly filled up have a tendency to settle, especially during wet weather, and if due allowance is not made for this the stones may give way and the plants be displaced and ruined.

It is usual when making a rock garden to begin with the soil—that is to say, heaps of soil are thrown up on which the stones are fixed afterwards. Now I consider that this method is entirely wrong. A newly-constructed rock garden, like a newly-built house, can never be safe without

A Good Foundation.

My maxim, therefore, is to begin invariably with the stone, and not with the soil, which latter should be filled in behind the stones as the work proceeds. If the foundation stones give way the whole structure is endangered. The foundation stones, therefore, must be so placed that they cannot be shifted from their position by subsequent pressure of soil settling behind them. One of the simplest methods of effecting this is illustrated by diagram No. 1 (see illustration), which shows, in section, the formation of a small rocky bed. In this case the stones A and B, which would have to bear the pressure of filled-up soil and stones (represented by C), have been sunk into the solid ground (E), which has been excavated for the purpose. Stones thus placed will bear any amount of pressure produced by soil, &c., settling behind them, and this will only make them still firmer. If a stone of that kind is not bearing tightly on the solid ground, as, for instance, in the case of stone A (illustration No. 1), this may be remedied by driving a wedge-shaped stone (D) firmly between the stone and the soil.

As in rock-building it is desirable to introduce as much change as possible into the work, it may sometimes be desirable to arrange large stones in an overhanging position. In order to be always



ECTION SHOWING THE
FIXING OF STONES
BY LETTING
EM DOWN IN FIRM
GROUND.

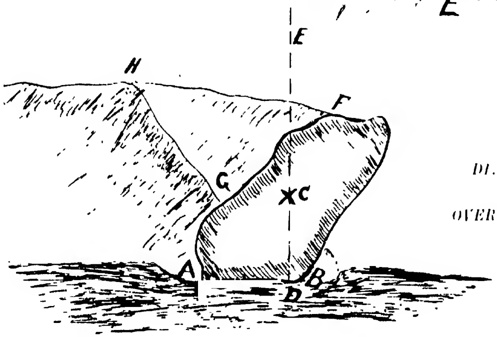
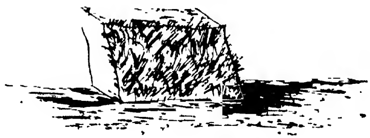


DIAGRAM OF STONE
IN AN
OVERHANGING POSITION.

BEST SHAPE FOR THICK TURF
FOR SETTING UP
STEEP GRASSY BANKS.



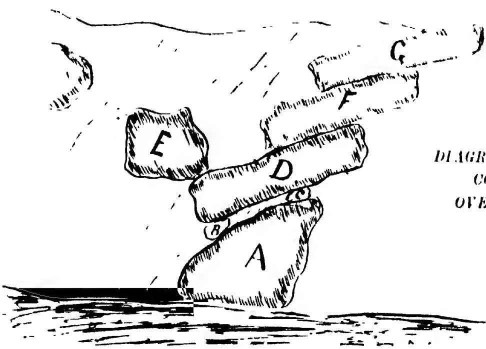


DIAGRAM EXPLAINING THE
CONSTRUCTION OF
OVERHANGING ROCKS.

sure that this overhanging is not carried to a dangerous extent, it will be well to remember a simple rule of gravity as applied to the law of parallel forces, *i.e.*, an overhanging body is perfectly safe as long as an imaginary perpendicular line through the centre of gravity falls within the base on which that body rests. Diagram No. 2 illustrates this. C is supposed to be the centre of gravity of the overhanging stone, E D is the imaginary perpendicular line, and A B the base. The stone represented in the diagram, therefore, would be perfectly secure. But we have to reckon not only with the overhanging stone itself, but also with the pressure of soil behind it. The angle of rest for filled-up soil is, roughly speaking, about 40°. This angle is represented in the diagram by the line H Q. The stone would therefore have to bear the weight also of the soil represented by the triangular piece H G I, and to make sure of absolute stability it would be well in this case to insert an extra support (the wedge-shaped stone indicated by a dotted line) at B.

Sometimes it may be desirable

To Construct an Overhanging Rock

on a larger scale. As a rule such rocks do not admit of being planted with choice things. They

are very handy, however, to form a kind of protecting roof over plants which require little moisture, such as Opuntias, &c. In building such rocks the above-mentioned law of gravity would apply not only to each stone, but also to the structure as a whole. Illustration No. 4 will explain my meaning. The long overhanging stone D does not fit well on the foundation stone A. To give it a better bearing the small stones B and C have therefore been inserted, and made the stone D perfectly secure. But in order to make the stone D stand also the additional strain of the overhanging stones F and G, more weight at its lower end is required, and this is represented in my sketch by the stone E and the soil resting above it.

Soil filled in behind the stones must be firmly rammed to prevent settling to any dangerous extent; that it must also be suitable to the particular kind of plants which are to be grown goes without saying. When writing of the arrangement for effect I mentioned that rocks, to look picturesque, should not be too continuous, but be broken here and there by intervening banks of grass, planting, &c. Sometimes it is necessary to have such grassy banks rather steep. If this steepness does not exceed an angle of, say, 40° to 45°, I find it is best to set up the front of such a bank with pieces of turf eighteen inches or

fifteen inches long, one foot wide, and about four inches thick. Such pieces of turf, if cut not square but diagonally, dovetail firmly into each other, and if the first layer of such turves is sunk a little into the ground its stability will be assured. For very steep slopes, however, this method would not be practicable. In such a case it would be best to set up the front of the bank with ordinary pieces of turf cut the usual size, namely, three feet long, one foot wide, and about one and a half to two inches thick. By placing such pieces flat, one on the other, and then ramming the soil behind as the front is built up, a much stronger bank will be the result. The drawback is that the green sides of the turf would not show like those of thick turf, but would be buried. As, however, the roots of the grass would be still there, the front of such a bank—though bare at first—becomes covered with green sward very quickly. All kinds of plants may, of course, be put in as the work proceeds, and their roots will give additional stability to such a bank by holding the soil firmly together.

CHAPTER XVI

HOW TO IMPROVE NATURAL ROCKS

NATURE is so perfect in her works that to write about making improvements on natural rocks would seem foolish. Yet it often happens that a piece of ground as left by Nature is quite unsuitable for both gardening and building until considerable alterations have been effected. Especially is this the case in districts where steep hills and natural rocks abound. To obtain a level spot for building the house under such circumstances means not infrequently an enormous amount of excavation, and, if the ground to be excavated is of a naturally rocky nature, the difficulties are still further increased. For the same reason the approach to a house built under these conditions often entails a considerable number of obstacles being overcome, not the least of them being the necessity for a gradual and easy ascent to the house. Carriage drives leading to houses built on steep hills are often ugly and zigzag, which mar the otherwise pic

turesque natural scenery. In other cases it may happen that in order to get the desired gradual ascent a deep cutting through rocky soil has to be made, in which case the rocks are generally sloped back to ensure their stability.

From merely a practical point of view this treatment might suffice, but it would, of course, be opposed to picturesqueness, because rocky slopes under these conditions would always more or less resemble a railway cutting or embankment. The rocks left may be natural enough, but the cutting of the drive and the regularity of the slope spoil their shape and make them barren and ugly. Especially is this the case when such a cutting is of considerable length, and therefore becomes monotonous in appearance. It is in cases like these that one wants to give the

Stiff and Ugly Slopes a Natural Outline

partly by excavating and removing portions of the existing rocks or stony soil, and partly by adding other rocks built up artificially, but harmonising with the surroundings in such a way as to obliterate all traces of artificial interference.

To do this successfully requires, in the first place, a careful study of the rocks in question; secondly, a careful selection and a still more careful manipulation of the additional stones to

be used; and last, but not least, a judicious partial covering of both old and new rocks with suitable plants. To look natural, the stones used must be in every respect similar to the existing rocks, and if loose pieces which have long been exposed to the weather can be obtained, so much the better. Sometimes it may happen that such stones can be quarried on the site itself, and those removed from portions of the slope where excavations took place form the building material for projecting parts of the new work.

I have pointed out in previous chapters that

The Greatest Charm of a Rock Garden

consists in variety of form, and, to ensure this when treating a monotonous slope the irregular forms should be emphasised as much as possible When, for instance, projecting rocks are adjacent to a deep recess, the one will emphasise the other

Then, again, if in places the rocks can be intercepted by intervening grassy banks or dense masses of plants, a further step towards natural effect will have been obtained. If the natural rocks in the slope to be treated are of the unstratified or igneous kind, the work of arranging the new material will not be so difficult as when the rocks belong to the stratified or sedimentary class. In the latter case the new wor

ROCK GARDEN, HOLLERDAY, LYNTON.

SHOWING HOW STIFF SLOPES WERE MADE MORE ATTRACTIVE BY

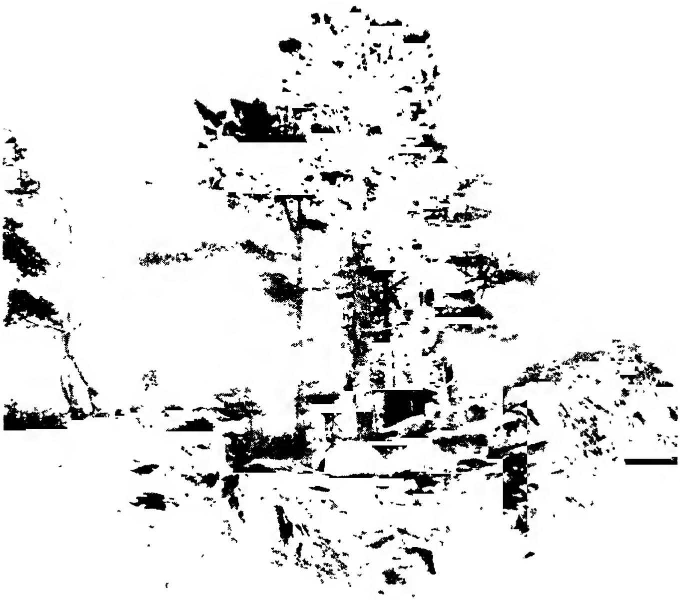
must, of course, show the same kind of stratification as the old existing rocks, with which it should blend in such a way that it would be impossible to tell exactly where the old part ends and the new part begins.

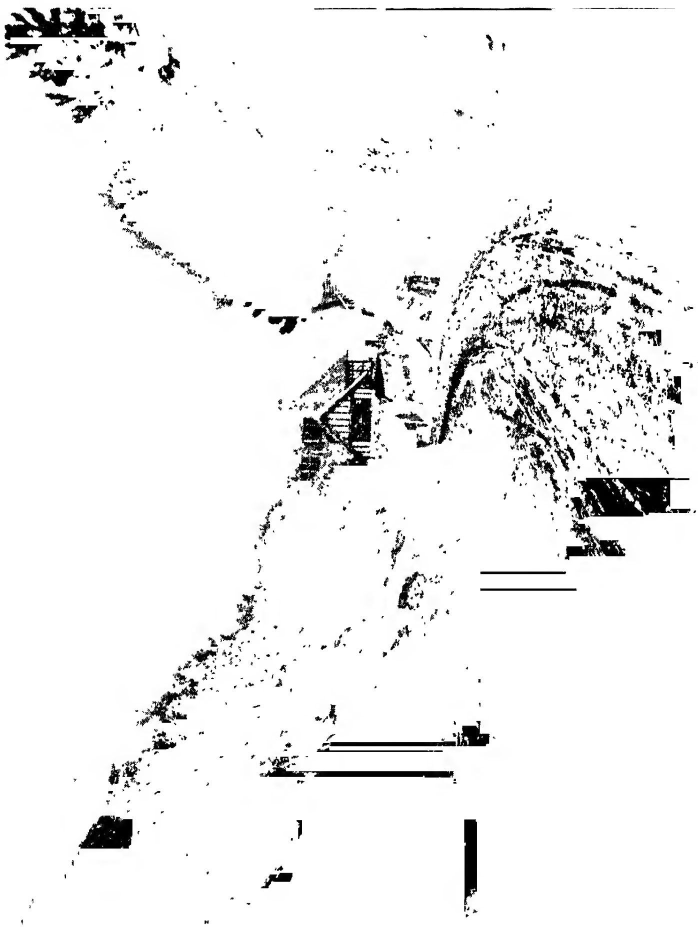
Since practice is better than mere theory in this work, I think I cannot do better than give an actual example of such work. The accompanying three illustrations represent a portion of the grounds at Hollerday, Lynton, the Devonshire estate of Sir George Newnes, Bart.

Hollerday is situated on a lofty hill commanding a view of magnificent scenery, consisting of huge rocks, woodlands, and picturesque seascape and river scenes. To reach the mansion a carriage drive had to be cut through a hill of rocks. In places this cutting is over twenty feet, and though the rocks were sloped back, their appearance could, nevertheless, be compared with nothing else but that of the deep railway cuttings which are so abundant in this county. With a view to improving the somewhat stiff and unattractive appearance of these slopes, extensive excavations were executed here and there, and in other places additional projections were built so as to resemble the original natural rock, but imparting to the latter a more rugged outline. Such a projection is shown on the left in the foreground of the first picture. This picture shows the beginning of the

carriage drive photographed from immediately inside the main entrance. By way of balance, but without being symmetrical, smaller projecting rocks were also introduced on the right hand side of the drive, and these are visible in the picture jutting out from a mass of plants intermingled with stretches of green sward. In the distance, at the bend of the drive, two irregular cave-like recesses were produced by simply making excavations into the existing rocks, which, like the rocks of the whole district, consist of the rugged Devonian slaty grit known as bastard shale. How this kind of stratified rock has been metamorphosed by contact with igneous rocks I have already shown when illustrating precisely the same kind of rock as occurring naturally in Mr. Ford's garden at Lynmouth. The stones gained through excavations in Sir George Newnes's ground were for the greater part too small, but as other weather-beaten stones of similar appearance could be had in abundance close by, I naturally preferred to use the latter.

The second illustration is from a photograph taken near the farther end of the same drive. In this case a straight hedge ran along the top of the stiff slope, but by removing this hedge and by producing a large depression — afterwards covered with sward, boulders, and new groups of





stratified rock carefully grafted, so to speak, to the existing rocks—a totally different and more pleasing effect was obtained.

The third illustration represents still another view of the drive, *i.e.*, looking downward in the opposite direction to that given in the first picture. The larger projection in the foreground of the first illustration is seen in this third picture in the distance on the right. The building (of which only a small portion is visible) is outside the grounds; it is the fine town hall presented by the owner of the estate to the town of Lynton. The rocks in the foreground are quite twenty feet high, and, as the illustration shows, were made irregular through excavations in the form of large and small cave-like recesses.

In adorning these rocks bold plants with arching branches, such as *Rosa setigera*, various Briars, rambling Roses, *Rubus deliciosus*, and others were put on the highest rocks, where their drooping clusters show to the best advantage. Lower down, and more on a level with the eye, many hundreds of smaller rock shrubs and alpine plants too numerous to mention were introduced. In many places planting in the ordinary way would have been impossible, and it was necessary to make holes by means of bars or chisels for soil for the plants. Colonies of Androsaces, Thrifts,

Phloxes, Aubrietias, Dianthus, &c., were planted, and, in conjunction with Wallflowers, Valerians, Ferns, and other things in the rougher parts, gave a bright show of flowers. Seeds were sown in chinks and fissures.

CHAPTER XVII

WATER IN THE ROCK GARDEN

FORTUNATE is the owner of a garden who has a stream of running water through his grounds. Water is the life of scenery. Picturesque vegetation, blended with rocks and running water, is the most fascinating picture Nature can produce. Hence in the rock garden, where we try to follow Nature's law in the arrangement of everything, the addition of water is a most important factor, enabling us to impart to the silent rocks the charm of life and beauty, pleasant not only to the eye which follows the rippling water in its merry dance over rocks and boulders, but also to the ear, on which the soothing murmur of running or falling water has a particularly pleasing effect. I do not wish to imply that no rock garden can be perfect without water; on the contrary, I have shown in previous chapters that without the presence of any water whatever interesting and picturesque rock gardens might be constructed, but so great are the additional advantages of water that whenever the

chance occurs to have it introduced into the rock garden it would be foolish not to take full advantage of such a chance. Nor is it from a picturesque point of view only that water is so desirable, but it is most useful as well. Since mountain plants from high alpine regions require a moisture-laden atmosphere to flourish in, this can be supplied in the rock garden through the constant evaporation from ponds or streams. For watering, too, the water, say, from a pond among the rocks is more beneficial to the plants than if supplied by means of a pipe or hose.

Evils of Stagnant Pools and Fountains

Desirable as water may be, there are, however, two forms of it which, in my opinion, are most unsuitable to a rock garden, namely, a stagnant pool and a fountain. The former is an abomination wherever it may be. It becomes covered with slime and filth injurious to choice water-lilies, &c., to say nothing of the evil odours constantly arising from such a pool. A fountain is free from such danger, but it is equally objectionable for other reasons. When we make a rock garden we try tc imitate Nature, and endeavour to place the rocks in such a way as to conceal their artificial origin, and strive to make our handiwork as bold anc rugged as possible. But a squirting water-spout,

or in other words a fountain, is utterly out of harmony amongst such surroundings. In a formal garden, or even on a lawn, or amongst beds of flowers in a more or less regular part of a pleasure ground, a fountain may be quite desirable, but in a rock garden it is one of the things to be avoided at all times.

On the other hand, such forms of water as a lily-pool fed by a streamlet, a running brook, a spring emerging from a cleft in a rock, waterfalls of various kinds, or a bog garden are desirable, and if adorned with an appropriate fringe of vegetation such forms of water would greatly enhance the charm of a rock garden, even if this be only on the most modest scale, because it would make it more interesting and picturesque ; and last, but not least, it would enable us to grow an infinitely greater variety of plants.

The Ideal Site for a Rock and Water Garden

would be, say, an old disused quarry pit with a running streamlet near it. On such a site both rocks and water would provide endless scope, and might be arranged in a variety of ways without much trouble. It would, in fact, be possible to obtain the maximum of effect at a minimum of labour and cost. All that might be needed in

such a case would probably be to make the outlines of the quarry as rugged as possible by excavations and additions, and to use some of the stones thus gained for the judicious embellishment of the natural stream, which might otherwise be left practically unaltered in its course.

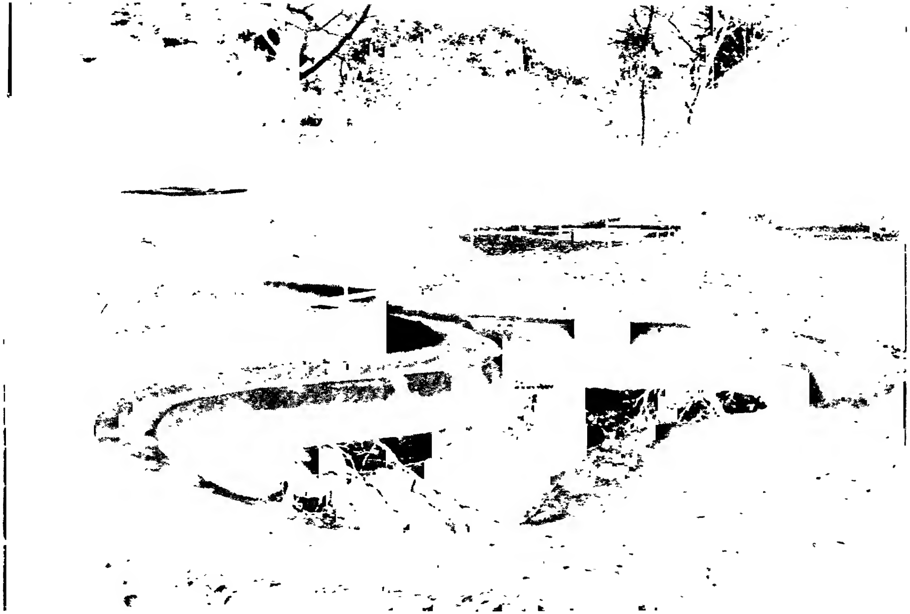
It is seldom, however, that such ideal conditions prevail, and in ninety-nine cases out of a hundred it would most probably be necessary to have the water laid on in pipes, &c., and to have the sides and bottom of streams and ponds secured by subtantial concrete, preferably cement. I have a great aversion to cement in a rock garden, and never use it when I can avoid doing so. But in the case of water artificially introduced there is, as a rule, no help for it. And, after all, what does it matter, as long as every trace of cement is afterwards masked in such a way that no one can possibly suspect its presence, while, on the other hand, permanent stability is secured by its use. The mistake most people make when constructing ponds or other forms of water in the rock garden or any other part of their grounds is that they have the masonry part carried above the water line in such a way as to leave a uniform and continuous margin of cement or stones plainly visible at all times, even when the pond is quite full. This method I consider absolutely wrong, since it is impossible to reconcile such a stiff margin with

GRASS FIELD MADE INTO A ROCK AND WATER GARDEN AT ABBOTSBURY.

constant evaporation, a moist atmosphere, which is most beneficial to alpine plants from high mountain ranges.

The size and shape of a pond must naturally depend greatly on circumstances. The size, of course, will have to depend on the ground and the facilities for excavation, and, above all, the size of the rock garden itself. It is well to bear in mind that it is always advisable to avoid a crowded appearance, and that it is most desirable to be able to walk around the greater portion of the pond and to have access to the various plants used. Rather than bring the pond close up to, say, a high and abrupt bank of rocks, it would be a better plan to make it a little smaller and allow for a space wide enough for walking upon between the pond and any high rocks adjoining it.

As to the shape, we must look to Nature as our guide, and observe her ways of forming ponds and streams. I mention streams because a natural pond, after all, is in most cases only a naturally widened stream, and subject to the same natural laws in its formation. Let us for a moment follow in imagination the course of a natural streamlet in its meandering through a rocky district. The natural consequence of flowing water coming into contact with a projecting piece of rock will be to divert the course of the stream to the opposite bank, and if that bank



ROCK AND WATER GARDEN.

TRANSFORMED FROM A TENNIS COURT. (See page 100.)

consists of material softer than the rock, the washing out of soil and the production of a hollow place will be the inevitable result. If, then, in the construction of the rock garden pond we wish to give that pond or pool a natural appearance, we must bear this in mind. In other words, roughly speaking, in Nature's streams and ponds a convex outline of one shore-line would have a more or less concave outline on the opposite bank, and *vice versâ*. If, therefore, we give to ponds connected with rock gardens an outline of circular, oval, square, or any other regular shape, we blunder. It also follows that when we make a pond in the rock garden the convex portions of the shore-line which project more or less into the water should consist of more massive rocks than the concave recesses, which might well be of green sward only with suitable plants protruding from it.

What to Avoid

An absurdity which cannot be condemned too sternly is the making of ponds in such a way as to have ground much lower than the water-level close to the pond, or, worse still, to have them perched on a hill, or in a high part of the grounds, and to have steep banks supporting the artificially-raised surface of the water. In Nature ponds are formed by water accumulating naturally by

gravitation into depressions in the lowest and not in the high parts of the ground. To have a pond on a high level, say on a rocky plateau some distance away from the low ground, may seem right enough, but a depression close to a pond would look ridiculous, as a natural accumulation of water would have filled the low place first.

Another mistake frequently made when making artificial ponds is to allow the walling or cementing of the sides of the pond to be visible above the water-line, showing a distinct line so stiff and hard that no one would ever dream of supposing the pond to be a natural one. To avoid this I construct and arrange all ponds in such a way that a shelf or shoulder runs all around the pond and not less than six inches below the water-level. On this shoulder turf or stones can rest, and thus appear continued below the water-line. But of this more anon.

Ponds Made without Masonry

Sometimes it happens that the ground on which it is desirable to have the pond has a subsoil of hard, impervious clay, or that the water supply is so abundant that the soaking away of some of the water into the soil would be of little or no consequence. In either of these cases a

very picturesque pond of quite natural appearance might be constructed most easily and without any masonry. If the ground is such that the pond when excavated to the right depth holds water at the bottom but not at the sides, which consist of more porous soil, an easy method of rectifying this might be adopted. This consists in taking out a vertical trench, say one foot to two feet wide, all around the pond and at some little distance away from the actual shore-line. This trench is excavated to such a depth that it reaches well into the impervious clay subsoil; it is then filled up with clay, well worked and kneaded to the consistency of "puddle."

When neither sides nor bottom are watertight, puddling with well-worked clay is often resorted to, but as a rule this is unsatisfactory, especially if moles and water-rats abound: these sometimes play sad havoc with ponds, and leaks once made are difficult to locate and expensive to repair. In such a case cemented ponds are best and most satisfactory.

Cemented Ponds

Unless the cementing of a pond is done in such a way that every trace of masonry can be hidden from view, it must be an eyesore. My method consists mainly in getting a firm shelf eight inches or so wide and six inches below the water-level.

It matters not whether the bottom and sides of the pond are secured by concrete or by walling with stones or bricks, as long as it is made water-tight, but the shelf or shoulder is the most important part. As a case in point I give here a further illustration showing the making of a pond at various stages. This was constructed for Mr. A. Bartholomew at Park House, Reading, when during the progress of the work I took the photographs from which the accompanying illustrations were prepared. The site was most unfavourable, being, in fact, an ordinary cinder tennis court. Illustration No. 1 shows the preparatory work and the ugly cement work, with the shelf referred to running all around the pond. No. 2 shows the completed work photographed from the same spot. Since then, of course, the plants have grown and developed, and made the difference still more striking.

The third illustration is from a photograph taken only five days later than No. 1. It shows better than words the use of the shelf or shoulder referred to, which forms a firm resting-place for stones or turf below the water-line. The fourth picture was also taken only five days later than No. 1, and shows how the ugly, box-like structure in the background of the first illustration was transformed into a cave and waterfall. The pond is about two and a half feet deep, and the

CAVE AND WATERFALL IN THE ROCK GARDEN AT PARK

Water-lilies and other plants with which it is embellished have flourished exceedingly well. The same might be said of the Japanese Iris (*Kæmpferi*) in the margin, and the hundreds of varieties of choice rock plants in other parts of this rock garden not visible in the illustration. Mr. Bartholomew, being a keen enthusiast and a most successful cultivator of those alpine plants which are considered difficult to manage, has succeeded admirably in making his favourites feel thoroughly at home.

CHAPTER XIX

RUNNING WATER IN THE ROCK GARDEN

THAT ponds and lily pools, either natural or constructed so as to resemble Nature, greatly enhance the delights and the possibilities of a rock garden, has already been mentioned. I will now deal with another form of water in the rock garden, namely,

RUNNING WATER

Pools and ponds, by means of their reflecting surface, give light to the rock garden; but running water gives actual life to the scene as it dashes over rocks and boulders. Running water is at all times one of the most delightful adjuncts to a rock garden, and one of the most useful as well, since it can be turned to good account in a variety of ways. Of these the most important are streamlets and waterfalls.

Natural Streamlets. We are lucky indeed if a natural stream or brook traverses the ground close to the site of our rocks, and if the supply of water

is constant. It is an easy matter, as a rule, to divert the course of such a streamlet wholly or partially, and to lead it through the rock garden. On the water-soaked banks of such a stream we are able to grow an endless variety of plants which love the water side. Such a streamlet, too, can be made most picturesque at little expense; for, if the water-supply is fairly abundant, a little waste is of no consequence, and very often it is possible to save the cost of securing the sides and bottom of such a stream by concrete or other watertight materials. Especially is this the case if the subsoil consists of clay.

I always find it a good plan to arrange the levels of flowing water in such a way that a rapid current can occur only when stones or rock form the sides and bottom, and would prevent too much wash. Where the ground is soft a rapid flow of water would soon wash away the sides and tear up the bottom; it is best, therefore, to keep the streamlet level on such unprotected ground, letting the water go back, say, to a depth of six inches to eight inches, and then fall over a succession of irregular miniature dams arranged with stones to resemble natural rock. Sharp bends in the watercourse should also be made by rocks, not only for the sake of greater security, but because in Nature we almost invariably find that where flowing water makes a sudden bend it is owing to coming in

contact with rocks which divert its course, and cause a wash on the opposite shore-line or bank, which would naturally assume a more or less hollow curve in consequence.

Artificial Streamlets in the Garden. The cases in which a natural stream can be utilised for the rock garden are naturally few. In nine cases out of ten, probably, where water is introduced this has to be done artificially; that is to say, it is drawn from some reservoir or tank, and is conveyed in pipes. It is more difficult in such a case to impart to the watercourse that wild and natural appearance so indispensable for association with rocks, but it is possible, nevertheless, to make an artificial streamlet in such a way that the uninitiated would never for a moment suspect its origin. To do this, not a vestige of the masonry, pipes, &c., must be visible, but all has to be masked with rocks and vegetation. Assuming, then, that the water is collected in some kind of reservoir, and is thence conveyed to a place near the site of the rock garden, say, by a two-inch pipe, or less according to the quantity of water at disposal, the first question to settle would be the exact spot where it would be desirable for the water to make its first appearance, say, at some distance from the rock garden proper. From this spot a winding trench is dug about one foot or two feet deep, leading in natural curves from the end of the

supply pipe to the waterfall, pond, or whatever the outlet is to be. The width should vary, of course, but it should be at least double as much as the width of the desired streamlet is to be when finished. The reason for this is best explained in the sketch showing a transverse section of a streamlet. The artificial bottom and sides are made perfectly watertight by means of cement concrete. When perfectly dry the sides are masked partly with thick pieces of turf set up on their edges and partly by rocks. Both stones and turf (as the sketch will show) are not placed close to the concreted sides, but so as to leave the spaces A and B, which are filled with soil. When the water has reached its proper level in the finished streamlet, these spaces would, of course, be thoroughly soaked with water, and form an excellent home for various water-loving plants. The Royal Fern (Osmunda regalis), Scirpus, Carex, and many others revel in such a position as this. Japanese Iris, too, do well if planted high enough, so that their crowns are well above the water-line, while their roots can reach the water. The bottom of the stream should be covered with river pebbles and well-washed river gravel, thrown in irregularly while the cement is wet. If well done this judicious washing would obliterate every trace of the artificial work, and a streamlet constructed on this principle may be made to look perfectly

natural. It should, of course, never be dry, and the smaller the supply of water the more will it be advisable to let the streamlet be a succession of miniature level pools stepped as it were, at regular distances, by rocks over which the water descends when the pools are overflowing.

At the beginning of such a streamlet, that is to say, at the end of the water-pipe, it is advisable to dig a pit, one foot or two feet deeper than the bottom of the streamlet proper, and to make this perfectly watertight, so as to form a kind of basin, which could collect the water as it spreads out. The best way of hiding the pipe, etc., from view is to place rocks in such a position as to resemble a deep cleft into a dark recess, so arranged as to make it impossible to see the end of it. If stones and plants are properly arranged, the water appears as a natural spring among rocks, and by putting a few bold-looking plants in the background this effect will be much enhanced. I will briefly now consider another kind of running water, namely,

Waterfalls

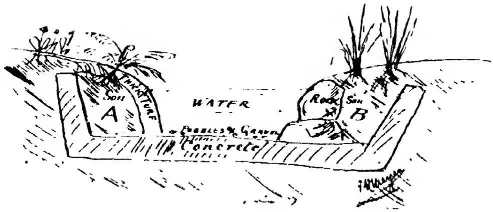
Though it cannot be denied that height is a great factor in the production of a picturesque waterfall, it must be remembered that an absolutely natural appearance is of far greater importance still. I have seen rock-gardens in which, by

means of water-pipes, the water was conducted to the highest pinnacle of the rocks, and allowed to fall from that height. Such an arrangement cannot appeal to us, because it is contrary to all rules of Nature, and betrays at once its artificial character. Wherever we see natural waterfalls, we invariably see also, either close by or at a distance, still higher ground from which the water has sprung. It is for this reason that I consider it necessary, whenever possible, to let the flowing water be visible before it forms the desired fall. An example of this kind is given in the accompanying illustration, representing part of a rock garden, constructed for Mr. C. Bewes, Gnaton Hall. (The rock garden as shown was constructed the year previous to the photograph being taken. —Ed.) The figure in this picture is standing near the spot where the water makes its first appearance, and forms a streamlet winding in and out among the rocks. This streamlet is invisible from the particular spot from which I took the photograph, but the little waterfall is plainly seen descending over a small cave. As the water-supply in this case was very limited, the cave furnished that desirable dark background which makes it possible for the falling water to be seen distinctly. Had the fall been so arranged as to fall merely over a structure of stones, this limited quantity of water would have been almost lost to

view. In front of the cave will be observed a stepping-stone bridge. Among the plants visible to the margin are Iris, *Kæmpferi*, *Rodgersia podophylla*, *Chelone Lyoni*, and others, while on the higher level are alpines. As a rule waterfalls descending in one single sheet are monotonous, and the more they are broken up the better. But sometimes it may happen that the supply of water is so limited that it is desirable to show it off to the greatest advantage. In such cases I find it very advantageous to spread out the water as much as possible. The best way of doing this is to construct a sort of basin which collects the water and then spreads it out over a smooth level.

Waterfalls with an Abundant Supply of Water

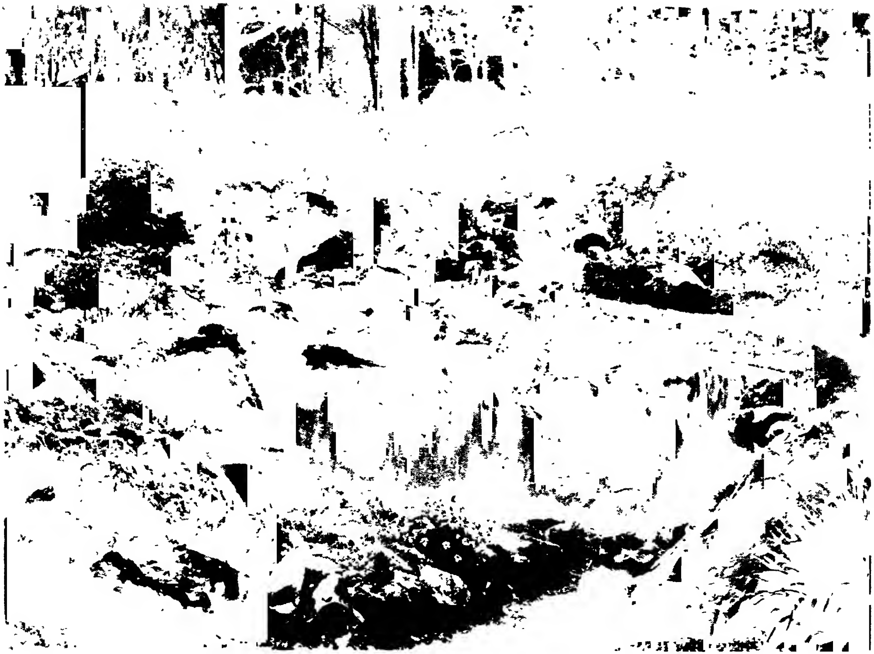
When the water-supply is abundant it is much easier to put it to good account in the rock garden than when the supply is limited. It is not necessary with an abundant supply to take care that every drop of falling water can be distinctly seen. A dark cave for a background and similar devices can, therefore, in such a case be dispensed with. A most effective way of showing off a waterfall with an abundant supply is to let the water descend over a series of rough irregular steps resembling natural rocks, and constructed



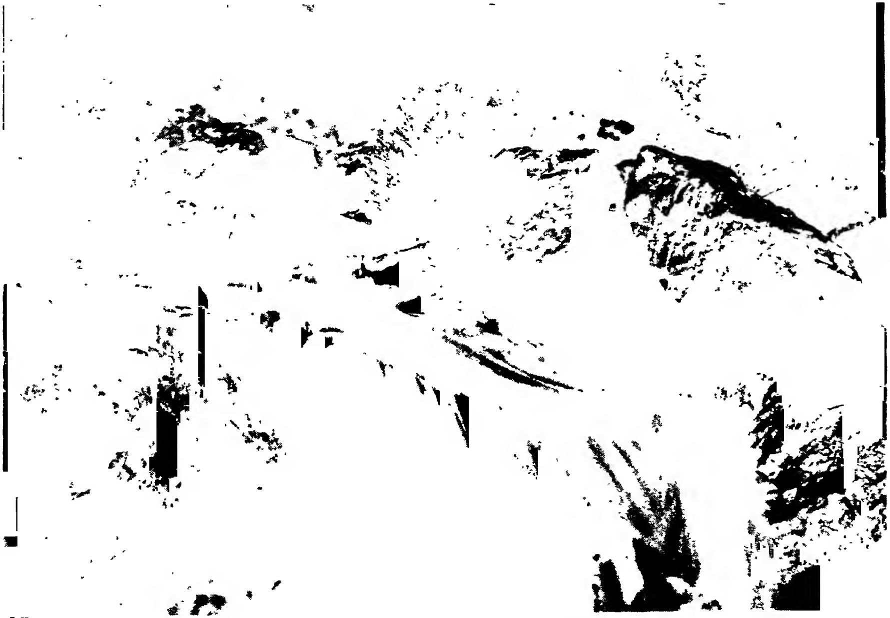
SKETCH OF TRANSVERSE SECTION OF ARTIFICIAL STREAMLET SHOWING HOW THE MASONRY IS MASKED.

(*See page* 165.)

SMALL WATERFALL IN ROCK GARDEN AT GNATON HALL



WATERFALL IN ROCK GARDEN AT NEWNHAM PARK, DEVON.



NEARER VIEW OF THE SAME WATERFALL.

in such a way as to correspond with the strata of the adjoining rocks. Sometimes it may happen that the water-supply is very abundant at times, but scarce during dry summers. In such a case it is best to be prepared for the worst, and provide a dark background against which the water would show to greater advantage when it is scarce.

Such an arrangement is very well shown by the illustration representing a rock garden constructed some years ago for Mr. G. S. S. Strode, at Newnham Park. It will be seen that in this case the waterfall is so arranged that the water does not fall down straight, but dashes against large boulders, which break the fall and divert its course. The second illustration shows the same waterfall by itself, and from this it will be seen that a dark background is provided, so that if—as occasionally happens—the water-supply is a scanty one, the falling water is still shown to the best advantage. The rock garden at Newnham Park was constructed entirely with stones found on the estate, consisting mostly of boulders with a weather-beaten surface darkened by ages of exposure. The stone is known locally as "Devonshire Marble," and consists of dark grey limestone veined with quartz.

The photographs from which the accompanying illustrations were prepared were taken soon after the completion of the work.

CHAPTER XX

BOG GARDENS IN CONNECTION WITH ROCKS

HAVING dealt with streamlets, ponds, and waterfalls, I will now mention another, perhaps, equally important form of water among rocks, namely bog beds and their construction. From a useful, as well as from an ornamental point of view, a well-arranged bog garden should form one of the most desirable adjuncts to a rock garden. Although the term "bog-bed" is sometimes used, there should of course, be not a vestige of regularity visible if such a bed is to be associated with rocks of natural appearance. If, for the purpose of retaining the water, cemented basins or other contrivances are necessary, they can easily be hidden by natural grouping, and by being filled up in such a way that no one would suspect their presence. Whatever the shape of the bog-bed might be below the surface of the ground, it will be found most effective only if above ground no hard-and-fast dividing rule appears at all. A bog garden enables us to add to the rock

plants. We cultivate such as would require an extra degree of moisture, and if both shady nooks and moist but sunny quarters can be arranged for them so much the better.

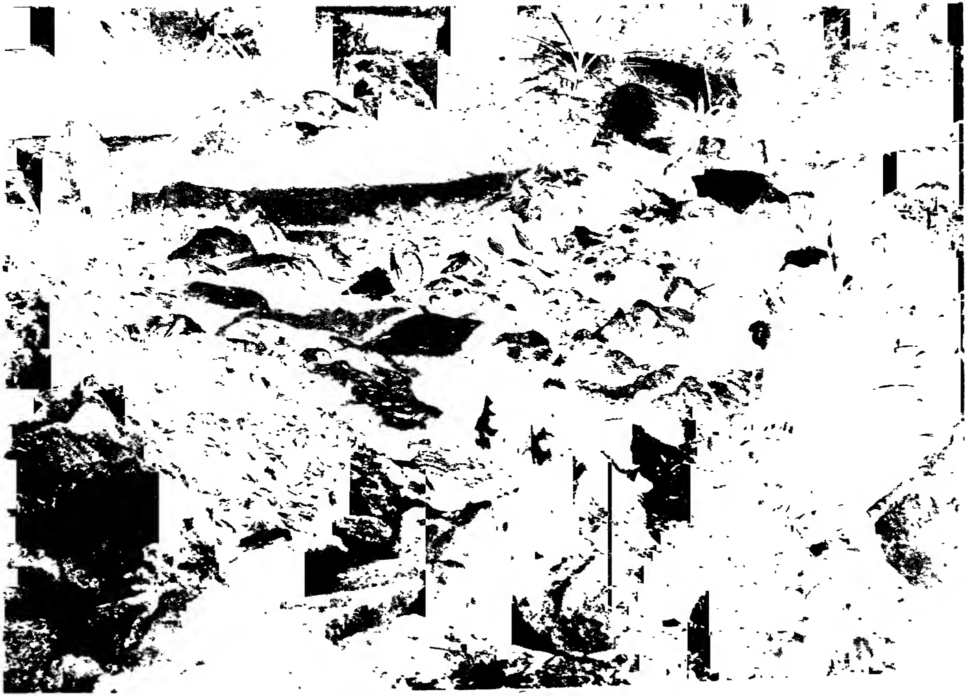
Natural Bog Gardens

If we should be fortunate enough to possess a natural swamp which can be connected with the rock garden little more will be required than to ensure perfect drainage. On the other hand, it must be borne in mind that too much drainage would leave the site too dry for the cultivation of bog plants. The best arrangement of all is one which would enable us to keep both the water-supply and the drainage under perfect control. An excellent opportunity of doing this is offered when the bog is slightly sloping, and a natural stream is in such close proximity that it can be tapped for the purpose of supplying the necessary moisture. In such a case little more will be necessary than to insert an ordinary drain-pipe at the side of the stream, and to connect with this a few branch pipes so arranged as to distribute the water evenly. The latter will naturally find its way to the lowest part of the bog garden, but not until it has thoroughly soaked the whole, when it might be made to rejoin the stream at a lower level.

The drain-pipes need not traverse the whole bed, but should be capable of ensuring a fairly even distribution of the water. By means of a plug connected with the main pipe in the stream the quantity of water can easily be regulated, or, if desired, the supply can be stopped altogether. That all pipes must be completely hidden by soil, rocks, or plants, goes without saying. Sometimes the overflow of a pond, instead of running to waste, might be effectively used to do duty in the bog garden. If the natural soil is unfit for the cultivation of bog plants, it must be excavated deep enough to allow for a liberal supply of leaf-mould, peat, and loam mixed with sand and gravel. For most plants a depth of 15 inches to 18 inches of good soil would be sufficient, but for the Moccasin flower (*Cypripedium spectabile*) and others a greater depth would be desirable.

Artificial Bog Beds without Cement

When the water-supply is scarce and has to be furnished by a small spring or by a pipe of limited size it will generally be found advisable to excavate a kind of level basin, made water-tight by means of clay-puddle and provided with an outlet and overflow. Sometimes the subsoil consists of an impervious clay, and if so the work is made easy. Since practice is better than theory in such



STEPPING STONES AND WATER CHANNELS AT GNATON HALL.

matters I will give an example of actual work completed in the year 1906, and further explained by the accompanying illustrations. The first one shows the site for a proposed bog garden at Gnaton Hall. It is situated not more than thirty yards or so from the waterfall illustrated on page 108. In the foreground are patches of weedy grass and rough sedge. On the extreme right, under a (then still leafless) branch of an oak tree, a Bamboo (*Arundinaria japonica*) will be noticed, whilst on the left is a high laurel hedge and a stony bank covered with weeds. Adjoining this is an ordinary rough hedge forming the boundary of an orchard. By the side of the hedge a small but continuous spring was discovered, and this led to the suggestion of a bog garden on this side. The second and third illustrations show the same site photographed two months later. In the case of the former my camera was fixed on the same spot as when the first view was obtained, but the latter shows the view in the opposite direction. The rough hedge and weedy banks are cleared away completely. The soil was then excavated much farther back than the original hedge, and the soil thus gained was used for the construction of a rocky bank high enough (when planted) to hide completely its surroundings.

As the planting had to be done in July, the rock shrubs and other large plants had been pre-

viously prepared for this by being grown in large pots and wicker baskets. As the subsoil consisted of very tough clay, a water-tight basin was easily produced by excavation only. The spring previously referred to proved more than sufficient to keep this basin filled one foot deep with water. Instead of filling up the whole basin with suitable soil I arranged for a series of irregular stepping-stones with natural open channels of water between them here and there. Water thus introduced is an excellent indication of the depth to which the soil is saturated. In some places the soil was kept about level with the water surface, whilst in others it was raised considerably above it, according to the requirements of the plants to be used.

The illustrations show, among other plants, *Sarracenia* (Huntsman's Horn) *purpurea*, *Sarracenia exoniensis*, *Iris kæmpferi* (Japanese Iris) of sorts, Himalayan Primrose (*Primula rosea*), *Primula sikkimensis*, *Ourisia coccinea*, *Shortia galacifolia*, *Spigelia marialandica;* whilst for carpeting the ground between the taller plants, *Houstonia serpyllifolia*, *Mitchella repens*, *Pratia angulaia*, and others were used. Away from the smaller plants a bold effect was produced by such things as *Rodgersia podophylla*, *Saxifraga peltata* and similar kinds.

CHAPTER XXI

WATER IN THE ROCK GARDEN

SMALL ponds and lily-pools in connection with rock gardens have been already mentioned, when hints from practical experience were given and illustrated by a rock pond at various stages during its construction. I will now consider ponds on a larger scale, the alteration of existing ones, the treatment of the shore lines, preparations for Water-lilies, the formation of islands, &c., and I will illustrate my remarks with photographs taken during the progress of the work.

LARGE PONDS

As in Nature there is nothing large or small except by comparison, the term "large ponds" may seem somewhat vague and indefinite. It might be as well, therefore, to state that by a large pond I mean a sheet of water at least 50 feet to 100 feet in length, and perhaps half that width. Ponds which are several acres in extent

are perhaps more accurately termed "lakes," and are not included.

Generally speaking, the hints already given as to natural shape, &c., of small ponds apply to those of larger size with still greater force. Ponds of square, circular, or oval shape, perhaps even with a circular island in the middle, may do well enough for a duck pond in a farm-yard, for a place for cattle to drink out of, or for a strictly formal garden, but in connection with a rock garden such shapes would make a picturesque combination of rocks and water by natural effects impossible.

Even when the pond has to be formed by putting a dam across a natural valley, there is no need to spoil a natural outline by the ugly straight line of a dam. The wall which forms the dam might quite as well be built in a curve, and if the convex side of such curve is turned towards the sheet of water the wall will be even stronger and resist more pressure than if it were built in a straight line. But even if for some reason or other the dam must be straight, this straight line can easily be so masked by irregular banks of earth and rocks on both sides as to appear perfectly natural.

Very often in the case of large or medium-sized ponds the water supply is such that a little waste does not matter, and if the natural subsoil consists of clay, the operations mentioned for making

small ponds perfectly water-tight may be needless in work on a large scale. If, however, the bottom consists of porous sand or gravel, the water will percolate through this very quickly, and the securing of sides and bottom by one of the methods previously described then becomes necessary. The best material for the purpose is undoubtedly cement concrete.

Sometimes it so happens that the ground forming the bottom of a pond is not solid, but consists of fill-up ground, which would settle down considerably if any heavy weight were put on it, or the ground may be of so soft a nature that the cement concrete would sink into it before it had time to harden, with the result that a series of troublesome cracks would appear, which are difficult to deal with. In either case I have found it a good plan to fix a network of strong fencing wire across the bottom before the concrete is put on. As the wire is completely embedded in the cement afterwards, it helps considerably in holding the concrete together and making cracks almost impossible. I will now say a few words on

The Treatment of the Shore Line

As a general rule it may be taken as a fact that a pond, if some portions of it are partially hidden from view, will appear larger than it really is,

because almost invariably the observer would unconsciously give imaginary extent to the hidden portions. To emphasise this effect the most prominent portions of the shore line, such as promontories or other convex portions projecting into the water, should show bolder groups of plants or more massive rocks than the concave or receding parts, which might often be left quite bare with advantage.

Not infrequently the sides of a pond are secured by dry walling, but, as in the case of small lily-pools, the practice of allowing the dry walling or any other kind of masonry to be visible above the water line is to be strongly condemned. A shoulder or bench below the water level is most useful for supporting either stones, soil, or turf, and allowing these to dip right into the water, completely hiding all walling, &c., above the water-line. A shore-line treated on these principles will appear as being naturally continued below the water, and this is as it should be.

Islands

Many owners of large ponds are anxious to have one or more islands in them. Not infrequently a circular wall is built in the middle, the space so enclosed is filled with soil, and the island is finished! I consider this method altogether wrong. In Nature islands would only under

most exceptional circumstances occupy the middle of a pond. In most cases they are the result of some disturbing influence on the shore, such as a landslip or the falling of massive rocks which have become detached from some projecting cliff, or by a promontory which was washed by water in such a way as to become eventually entirely separated from the shore. In the majority of cases, therefore, we find natural islands near the shore rather than in the middle of a pond, unless they were the direct result of volcanic upheavals.

The shape of islands, too, deserves our attention. Natural islands are never circular, but often more or less wedge-shaped, with the head or blunt end turned towards the influx of the water and the sharp end directed towards the exit of the stream that feeds the pond. The reason for this is obvious. That side of the island which offers resistance to the incoming current would naturally become flattened or rounded off, while the other end, owing to the continuous grinding influence of the outgoing stream on either side, would become elongated into a sharp point.

Preparing for Water-lilies

Water-lilies may, of course, be planted in flat baskets and then plunged in the pond in

such a manner that the surface of the soil in the baskets is about ten inches to twelve inches below water level. But I prefer another method, which for years I have used with great success. It consists in the construction of totally submerged rocky islands filled up with suitable soil to the required level of, say, twelve inches below the water level. Decaying leaves and good loam are an excellent mixture for the purpose; but in filling up this soil allowance must, of course, be made for its settling down as soon as the weight of the water is upon it.

Altering Existing Ponds

Sometimes it may be desirable to construct a rock garden near an old pond of a shape very unsuitable for that purpose. In such a case an alteration of the shore line will be necessary, and as an example I will here illustrate a pond at Gnaton Hall. The first picture shows this pond with the water let out for the purpose of making alterations. It will be observed that the left side of this pond is formed by an absolutely straight wall; on the right a circular island, with a *Gunnera scabra* planted on it, is partly visible. In the distance the straight line of the wall is lost in the dark shadows of common Laurels. The plank bridge connecting the island with the shore was

decayed and dangerous. At the bottom of the pond will be seen a number of pegs marking out the proposed alteration of the straight line and the circle into more natural outlines.

Picture No. 2 shows the same pond two months later, photographed nearly from the same spot. From this it will be observed that the straight line on the left is completely altered; the Laurels and other rubbish were swept away, and their places taken by a waterfall with a stepping-stone bridge in front of it. The large *Gunnera* remained intact, but the shape of the island was altered and planted with Iris and other moisture-loving plants; of the numerous Water-lilies planted only one is visible in the picture. The plants on the water margin include the Great Reed (*Arundo Donax*), *Saxifraga peltata*, *Chelone Lyoni*, *Rodgersia podophylla*, *Senecio japonicus*, *S. tanguticus*, *Spiræa palmata*, Japanese Iris, German Iris, Royal Ferns in variety, many Carex and Scirpus, &c. The additional rocks, turf, &c., rest on a low wall built to within eight inches or so of the water level so that no walling is visible, but rocks and green sward dip naturally below the water.

CHAPTER XXII

WALL GARDEN MAKING—INTRODUCTION

Walls in the garden are often a necessity, not only on sloping ground, but sometimes even on fairly level spaces. The construction of such walls and the process of adorning them with all kinds of suitable vegetation is now generally termed "wall gardening." That in connection with such work an enormous number of problems may occur, according to the varying conditions of position, requirements, climate, surroundings, &c., is only natural, and the object of this and the following chapters will be to give practical hints and suggestions on this subject of wall gardening in its various forms.

A wall garden and a rock garden should not be confounded, nor should there, in my opinion, be any attempt at amalgamation, a step which could only end in failure from a picturesque point of view; in fact, I feel strongly convinced that both should be as distinct as possible from each other. A wall in its structure should be a wall plain and

simple, however much we might vary its adornment by plants. But a rock garden should contain either natural rocks or what appear to be such; it should, in fact, be as irregular as possible. Regularity in a rock garden would be fatal to its purpose, *i.e.*, the representation of a piece of wild, rugged Nature. For the same reason, too much irregularity in a wall would spoil its nature, and of all structures in the universe none are more deplorably repulsive in their effect than the so-called "rock walls," which resemble neither wall nor rock, but are bald and ugly.

When speaking of regularity in a wall garden, I do not for one moment wish to imply that the walls must always be in straight lines. On the contrary, it may often be most desirable to make them in curves, but their general structure should be regular and uniform in all but the planting, which will be found most effective when varying as much as possible.

The accompanying illustration shows a very striking case in point. It was prepared from a photograph which, by the kindness and courtesy of Sir Warwick Morshead, I was permitted to take at Tregaddick, in Cornwall. Here the ground immediately in front of the house slopes to such an extent that it was absolutely necessary to build a curving retaining wall to support a plateau sufficiently large to allow carriages to turn

with ease and without danger. It is a dry wall built of granite, and sufficiently deep to allow for a narrow piece of lawn to slope inwards, *i.e.*, towards the house, between the gravel plateau and the wall itself. The joints are filled with soil instead of mortar. In the illustration a luxurious group of fine Carnations (ten years old) fringes the top of the wall, while lower down are Ferns, Alyssum, Antirrhinum, Sedum, Eschscholtzia, Arabis, Valerian, &c., in great profusion.

Advantages of a Wall Garden

Rock gardens and wall gardens may be said to supplement each other. It often happens that a position most unsuitable for the one is at the same time most suitable for the other, and *vice versâ*. Thus in a small formal garden, where rockwork would be out of place, the owner need not on that account give up the idea of growing such of the choice mountain plants as would require the support of stonework, but he might construct a wall garden instead, in which the majority of such plants would thrive admirably if well chosen and properly planted.

If the formal garden is bounded by retaining walls, forming either a terrace or a boundary, there is no reason why such walls should not be made to yield a brilliant display of colour, and by

having an eye to successive effects they might be made attractive practically all the year round. Many alpines from high altitudes, and even some of the choicest gems of the mountains, will succeed in this position between the joints of the stones better than anywhere else.

Another most important advantage is that if our favourites are planted in a wall we may have them under our more immediate notice, as in the raised positions they would be nearer to or even on a level with the eye. Then, again, in the case of overhanging plants, their prostrate or pendent shoots can never be seen to better advantage than when gracefully suspended from a wall. Even plants which we are generally accustomed to grow on level ground, as, for instance, the Carnations shown in the illustration, gain considerably in effect by such an elevated position. On level ground the hanging down of the shoots of Carnations becomes a nuisance, as they have to be tied to sticks, &c., but the Carnations shown in the illustration look more graceful on the wall than could possibly be the case anywhere else. Moreover, their flowers are at the exact height of the average eye, and their perfume can be enjoyed without stooping or even without lifting the blossoms, an advantage which should not be overlooked.

Still another advantage of wall gardening is a

maximum of effect at a minimum of cost. Building a wall is easier and cheaper than constructing a good rock garden, and the plants growing in the wall are easily kept in order, requiring but little attention.

Wall Gardening and Rock Gardening Compared

Rockwork, when really well arranged, may be made a most charming feature in the garden, but when erected by incompetent hands, without regard to good taste or to Nature's simple laws, becomes unsightly. If the constructor of such rockwork does not possess the ability of imparting to his work that natural appearance without which no rock garden could possibly be a real success, it would have been better by far had such rockwork never been attempted, but given place to simply a plain wall, which could have been erected at less than a quarter the cost by an ordinary mason or even an intelligent labourer. It does not follow that a wall garden may be made a success in any position. On the contrary, it would be sadly out of place in the midst of very irregular or undulating surroundings, especially if it be a straight wall, and intercept the view from any important position as seen either from the house, or from such parts of the garden as would be

much frequented. In such a position a wall garden would be even worse than rockwork within a formal garden.

THE MOST SUITABLE SITE FOR A WALL GARDEN

We may, broadly speaking, accept the principle that a wall garden will be at its best only when constructed on more or less regular lines as a terrace wall, a boundary wall, or a similar position. There may be exceptions, of course, but on the whole a site connected with formal gardening of some kind will be found to be best, even if the formality is confined to the immediate surroundings of the house only. It very often happens that owners of gardens have long straight borders only 3 feet to 5 feet wide running parallel with a straight walk more than 100 feet in length, and that they desire to use such a border for rockwork. Now in such a position even the most skilful artist in rock-building will fail to produce work which would represent natural rock in an entirely satisfactory manner. The space would be too narrow in proportion to its length to admit of the necessary variation so essential to a natural appearance. But for a wall garden such a site would be just right—in fact, nothing could be better. If it should be desirable to devote the entire border to alpines or other mountain plants, we

may build a wall which would appear as if it had natural rock for its foundation. This is easily effected by scattering a few rough, weather-beaten stones of different sizes over such a border, and if skilfully placed and half buried in the ground these stones will convey the idea that the wall was built on the top of natural rock which is cropping up through the surface here and there, but reaches down to depths unlimited below the ground.

This would be perfectly natural in appearance, and in such a case we might combine rock gardening and wall gardening with success; but if the reverse should be case, *i.e.*, if, as is unfortunately still too often done, rockwork should be arranged on the top of a wall, the result would be ridiculous, from the fact that such a thing could not possibly occur in Nature.

PORTION OF WALL GARDEN AT TREGADDICH.
(Note Carnations in flower. See page 123.)

CHAPTER XXIII

VARIOUS WALLS AND THEIR POSSIBILITIES

WALLS, generally speaking, may be divided into two great classes, namely, dry walls, *i.e.*, built without cement or mortar, and masonry walls, which have the stones more evenly placed and the joints filled with cement or mortar.

DRY WALLS

A good example of dry walling is given in the accompanying illustration. It will be seen that there is regularity only in the top row of stones. Although the face of the wall is almost perfectly flat, without any projecting stones, the joints are uneven and irregular. It will be readily seen that for the purpose of wall gardening such a method of placing the stones has great advantages. The joints would admit the use of plants varying considerably in size and also in the root space they may require ; naturally the largest and deepest joints would be filled with the boldest kinds of plants.

In all dry walls, regular or irregular, the stones should be tilted backwards to allow the rain water to soak in between the joints, where the slightly sloping stones would carry the water backwards into the soil. If the stones do not naturally lend themselves to being tipped backwards in the manner described, the desired effect may be obtained by inserting small wedge-shaped stones, which would not only tilt the stone and make it more secure, but would also increase the width of the joint and make the latter available for more soil. The illustration shows several such instances of small stones introduced for that purpose.

Dry walls as a rule have only one face, and are built up against ground which falls abruptly, so that they form retaining walls which, without doubt, are the best for the purposes of wall gardening. If, however, such a dry wall was built standing quite free, forming a sort of boundary wall either of the garden itself or some portion thereof, it would be best to have it sufficiently thick to prevent the soil in its interior from drying up too rapidly during a spell of hot dry weather. Sometimes very pretty effects of planting may be had on walls of that description which mark the boundary perhaps of a formal garden, separating the latter from other portions of the ground. More especially is this the case when these walls need not be built sufficiently high to form a pro-

tection against cattle, &c., but divide merely different parts of the garden itself, where they could be kept so low that the eye would look down upon, and not up to, the plants on the top. A good proportion would be a thickness of, say, 2½ feet and a height of 3 feet to 4 feet. Walls of that kind possess the advantage of enabling us to grow plants requiring shade as well as those requiring a sunny position on the same wall, and sometimes both the shady and the sunny side may be seen at the same time.

Another kind of dry wall suitable for wall gardening may consist of a sunk fence dividing, say, the pleasure grounds from a park, meadow, or grass field. If the ground of the adjoining land should be fairly level or sloping towards the garden or pleasure grounds, then the sunk fence would not be suitable for wall gardening, because the additional railing or other fencing required to keep off sheep or cattle from the plants in the wall would be clearly visible from the garden, or perhaps even from the house,

But if, as is often the case, the pasture land slopes rapidly in the opposite direction, *i.e.*, away from the house, it is generally possible to have the dry wall which forms the sunk fence of such a height that a border, a path, and also a fence of some kind at a distance of, say, 5 feet or 6 feet from the dry wall would still be invisible from the

house and from the garden. Thus the dry wall may be turned to good account for wall gardening without the danger of being molested by cattle and without bringing a hard dividing line conspicuously into view. Still another kind of dry walling suitable occasionally for wall gardening would be the ordinary stone hedges which are so abundant, especially in the West and North of England. If such a hedge forms the boundary, say, of a small garden abutting against a road or field, there is no reason why the garden side, whether sunny or shady, should not be turned into a beautiful wall garden, made bright and cheerful by flowers of many sorts.

But the most important of all kinds of dry walls is

The Terrace Wall

It is here that wall gardening should be at its best, because the conspicuous position of a terrace wall will make it imperative that it shall be adorned as much as possible with suitable plants. Even terrace steps may often be constructed on the dry wall principle, and very ornamental they may be made with tiny plants protruding from every chink or fissure. It is wise as a rule to build dry walls for wall gardening not too high, so that the plants with which the wall is furnished are never, if possible, much above the average

level of the human eye. If the ground falls rapidly it would be better to have several successive terraces rather than a dry wall of considerable height, unless the terrace wall is a masonry wall, intended not so much for the purpose of growing plants on the wall itself as for being covered with ornamental creepers. In such a case, of course a higher wall might be desirable. As detailed construction of the various kinds of dry walls will be illustrated, I will now briefly deal with the other class of walls, namely,

Walls of Masonry

By walls of masonry are meant walls in which the stones or bricks are placed regularly and are held together by cement or mortar of some kind. It must not be supposed that such walls are entirely unfitted for wall gardening. On the contrary, they may often be made very ornamental indeed, but it takes longer as a rule to get the plants established, as in most cases these have to be reared from seeds sown on moss and soil pressed into the joints after a portion of the mortar has been removed. Sometimes, too, it is possible without doing great damage to remove a few stones here and there and make holes large enough to hold the soil. The task of establishing plants on a masonry wall is much easier if the

latter should be several years old (the older the better), and if it should already be partly covered with moss or other vegetation.

Where such walls of masonry are deep, terrace walls, say, near a large mansion, or where they are crowded with balustrading or other architectural features of importance, which in design correspond with the style of the architecture of the house and are probably built with stone elaborately worked, it would be a mistake to knock holes in them. It would probably be much better to cover them with handsome climbers rather than small rock plants, which on high walls of that kind would be out of place and too far away from the eye to be fully appreciated, while Roses and other bright flowering creepers, both deciduous and evergreen, would be far more satisfactory and produce a better effect.

CHAPTER XXIV

DETAILS OF CONSTRUCTION

In the previous chapter on "Wall Garden Making" I have in a general way described various walls, without, however, going into details regarding construction. It may be considered a very simple thing to make a wall garden, but as its success must in every case depend on the care exercised during construction, it may be helpful to mention at least the most important practical points.

Construction of Dry Walls

Dry walls (*i.e.*, walls which have their joints filled with soil instead of cement or mortar) are the most important for wall gardening. What pretty effects can be obtained by such structures was illustrated by the picture facing page 128, showing a fringe of beautiful Carnations on the top of the wall. I now show by means of the accompanying rough sketches how such a wall is

made. Sketch No. 1 shows a transverse section of just such a wall as the one above referred to. Roughly speaking, the largest stones are used at the bottom, and must rest on a firm foundation. Sometimes it may be advisable to let these bottom stones be partly buried in the ground, to guard against the possible danger of a slip. All stones used in the construction of a dry wall are tilted backwards, for the double purpose of giving greater strength to the structure and of allowing the rain water to soak down to the roots of the plants in the wall.

After the bottom layer of stones has been placed in such a way that these all lie firmly on their flattest surface, soil is put behind them and firmly rammed with a small stick or rammer. If any of the stones do not lie quite firmly, or do not tilt backwards sufficiently, this is remedied by small wedge-shaped ones being driven in firmly with a hammer until it is impossible to shake them without using great force. The bottom layer thus finished, it should be completely covered with good soil to a thickness of 2 inches or 3 inches. This soil is made to answer the purpose of mortar in ordinary walling, and into it the second layer of stones is deposited. The latter should not project out as far as the bottom layer, but should be set back in such a way as to leave a narrow ledge, which will be greatly to the

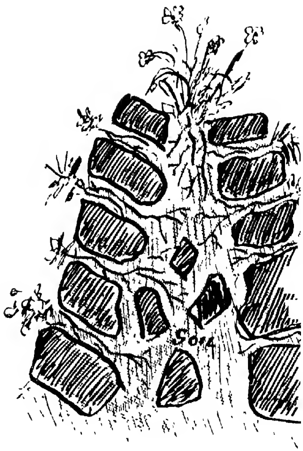


FIG. 2.

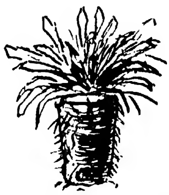


FIG. 3

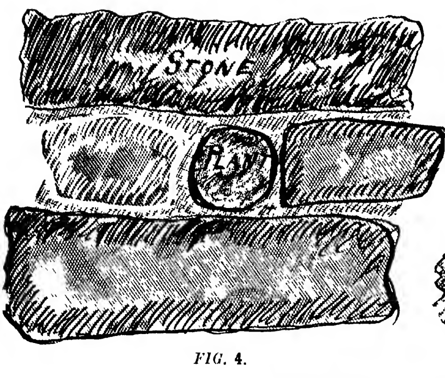


FIG. 4.

FIG. 5.

PLANTING A DRY WALL

benefit of the plants. Again soil is filled in and rammed behind the second layer of stones, and is also spread on the top of the same. In this way layer after layer is built up, not necessarily in straight lines, but varied according to the stones at disposal, or according to the plants to be used. In all dry walls stability is of the utmost importance. No matter how firmly the soil is rammed behind and between the stones, directly it has become well soaked with rain it will settle still more, and the stones must be so placed that this settling down does not affect their stability.

Whether the stones are of regular or irregular shape matters but little. Of greater importance is the necessity of varying the joints so that upright ones do not occur one directly above another, but are bridged over and "tied together" by the succeeding layer. Sometimes, too, particularly long stones are put, not lengthways, but crossways, so that when they have been weighted with soil they form a substantial tie between the outer surface of the wall and the bank of soil.

If the retaining wall was built at the bottom of a sloping piece of ground there would sometimes be a danger of an excessive quantity of water accumulating behind the stones before they had quite settled down. In such a case it not infrequently happens that the water-soaked soil behind the stones forces the whole wall outward and the

structure tumbles down. To prevent such a calamity it would be well, where this danger exists, to insert into a wall a few drain pipes at intervals, say, a couple of yards apart. This would effectually prevent the accumulation of anything like a large quantity of water behind the stones.

Illustration No. 1 gives an idea of the arrangement of an ordinary retaining wall. It shows in sections how the stones tip back, and how each layer of stones is set back a little farther than the preceding one to allow for the better development of the plants. The sketch also shows (though, for the sake of clearness, in a somewhat exaggerated form) the soil between and behind the stones.

Illustration No. 2 hardly needs explanation. The sketch represents a dry wall with two faces for planting. The spaces behind and between the stones are filled with soil in precisely the same manner as explained by sketch No. 1, the only difference in construction being that both sides of the wall must be built up simultaneously. The higher the wall the broader, of course, must be its base. Walls like the one sketched in section No. 2 may be made very ornamental indeed, as they offer the additional advantage of different aspects, and consequently a greater variety of plants.

While on the subject of the actual construction of dry walls, I would again suggest that there should be no elaborate attempt at irregularity in building the walls. Let the wall be built without any pretensions, plain and simple, and not have the appearance of very inferior rockwork. A wall is the work of man; rockwork should look like the work of Nature, and therefore the wider the difference between the two the better.

Planting Operations during the Building of a Dry Wall

To the planting of dry walls I have devoted a separate chapter or two, but while on the subject of actual wall building I should like to point out the advantages gained by planting such a dry wall, not after it has been completed, but while building is in progress. This might, of course, not always be practical, especially if the idea of making a wall garden was an afterthought, and had its origin in the desire to turn an already existing wall to good account. But in the case of new work, where the wall is specially built for wall gardening, there would be no excuse for letting such an excellent opportunity for most effective planting pass by unheeded. I do not think I am exaggerating when I maintain that planting operations while the wall is being built are ten

times easier, and more effective and satisfactory in every way, than planting a wall already finished. The reason is obvious. After a layer of soil has been spread on the top of the bottom layer of wall stones, quite a number of plants may be spread out over this soil. After the roots are properly spread and extended they are slightly covered with a little more soil. This is gently depressed. A few tiny bits of stone are placed right and left of the roots (to prevent their being crushed by weight), the next layer of stones is placed in a position, and the planting is finished. If carried out during autumn it will in most cases be unnecessary to do any watering, as the late autumn and winter rains are almost sure to supply all that is needed in this direction. It must be admitted that nothing could be simpler than this method of planting. Besides being most easy to accomplish, it has the enormous advantage over planting after completion of the walls, that from the start the roots of the plants are introduced into the medium specially prepared for them, and it would be difficult, indeed almost impossible, to get them into a similar position after the wall is finished. In some cases the pressure of the stones above will reduce the space filled with soil and plants to a very narrow crevice, but this does not matter, since it is the very state of things that many mountain plants would revel

in—for instance, Androsace, Aubrietia, Arabis, &c.

If plants in pots are used for planting, and there is some danger that if planted in the manner above described their roots would be unduly crushed, we have another way of ensuring their comfort, which I have tried to explain by the sketches 3, 4, and 5. Sketch No. 3 is supposed to represent an alpine plant (say, *Saxifraga longifolia*) with its pot removed and the roots loosened ready for planting. In sketch No. 4 this same plant is represented as a circle in the centre of the diagram. This diagram, or, rather, longitudinal section, shows how by means of small stones placed on each side of the plant the pressure of the large stone above is made quite harmless. Sketch No. 5 shows the same plant as it would appear when seen on the surface of the wall. Now, it will be seen at a glance that the soil around such a plant can at no time be filled in and rammed so easily and so effectively as during the building of the wall.

CHAPTER XXV

TREATMENT OF EXISTING DRY WALLS

Of new dry walls and their construction I gave full details in the last chapter, and I will now deal with old walls which were not built for wall gardening, but which it might be thought desirable to adapt to that purpose. In many gardens there may be several walls of that description, either dry walls or walls of masonry, which were originally built to mark a boundary or a division in the grounds, and which would lend themselves admirably to artistic adornment. Sometimes, too, such walls are of great age, having the surface of the stones or bricks darkened by years of exposure, and are perhaps even partly covered with moss and lichen. Such a wall might by careful treatment be greatly beautified. I will take the dry walls first. We will imagine that we have to deal with an old dry wall, and that from the soil between the joints of the stones weeds of all kinds have sprung. It should be fairly easy to eradicate such weeds by raking out the joints

with an iron bar or a large chisel. Where weeds of an exceptionally robust nature have taken possession it might even be advisable to use the iron bar as a lever for removing a few of the stones altogether, and either replacing them after the weeds are rooted up, or, if the absence of such stones does not seriously affect the stability of the wall, by filling these comparatively large holes with good soil and making them suitable for fine plants of a bolder type. Rock Cistus, Heaths, and Alpine Rhododendrons are suitable plants for such a purpose, or, if the wall is in the shade, large Ferns might be used with advantage.

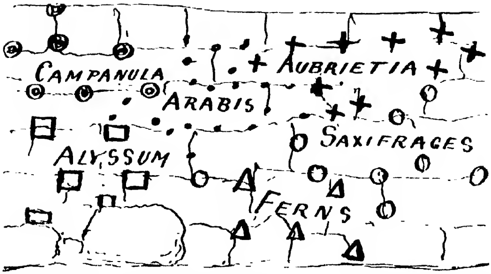
An important matter to be observed during this operation of planting is that the surface of the wall where we made the large holes must again be made good with small stones all around the plants. This will keep the roots moist, and will prevent the soil from crumbling away and falling out after frost. Stones which are more or less wedge-shaped are best for this purpose, and after the planting they should be firmly driven in with a strong wooden mallet. This, if heavy enough, is preferable to an iron hammer, which would be liable to break the stones.

Care should, of course, be taken not to make these holes for large plants at regular intervals, or—still worse—in lines, but in such a way that

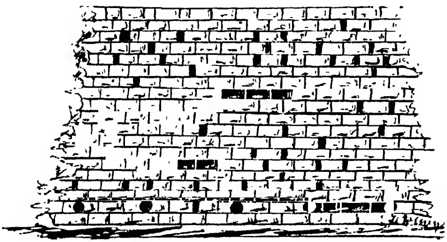
the plants when in position would form an irregular and natural group. They should be sometimes close together, sometimes farther apart, or scattered singly. For an example in Nature let us note a wall, say, in a shady country lane, which without the aid of man Nature has bedecked with a luxurious growth of Hart's Tongue and other Ferns, as well as all sorts of flowers. Let us take note of the way in which Nature has grouped these things, and then try and follow her admirable lessons.

The accompanying illustration shows a wall photographed in Cornwall during the middle of December; it encloses a farmyard, and has never been planted. Nevertheless, as the picture shows, it is covered with Brambles, Ferns, Primroses, Foxgloves, and a whole wealth of other things. Even now, without any of the plants being in bloom, it is picturesque. The broad leaves of the Foxgloves are distinctly shown in the illustration, and will convey a good idea of what is meant by a careless arrangement of plants. It will be observed that they are in clusters of five or six plants in one place, and form single specimens in another.

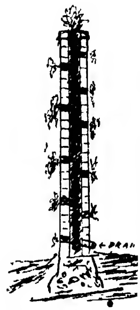
This is precisely the pattern on which we should work in arranging our plants on a wall. What was said about the larger plants also applies to small ones, except that these naturally should be



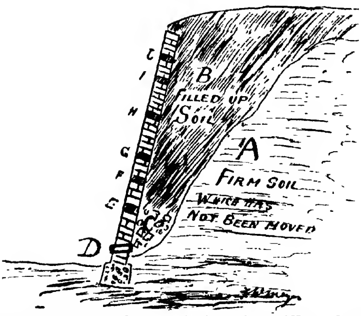
Showing how Plants should be Distributed on Face of Wall. (*See page* 147.)



Elevation of a regular Wall of Masonry with Holes for Plants at irregular intervals The round holes show position of drain pipes. (*See page* 152.)



Section of Upright with Soil in the Cen Openings for Plant: side. (*See page*



Section of Masonry Wall with Openings (E to J) for Soil and Plants.

placed closer together in irregular colonies merging into each other, but never in lines. When building a wall we do not pretend to imitate Nature, but we construct a piece of artificial work which no one could possibly mistake for anything else than the work of man. But when we adorn this wall with plants and flowers of various descriptions this decoration should in all cases be natural, not in the selection of plants, for that would mean decoration by means of wild native plants only, but in the disposition of various groups we should follow Nature's lessons, arranging some in large irregular colonies, others in smaller groups, and others again singly, while some portions of the wall might be left bare altogether.

To get good effects we must have bold masses of certain kinds, though it would be a mistake to let the chief aim in planting be to cram as many varieties of plants as possible into the space at disposal. A hundred plants of five or six kinds, disposed in irregular natural groups, will be a thousand times more effective than a hundred different things scattered over the same space.

It cannot be denied that when we are planting an existing wall the actual operation is more difficult than it would be if the planting were done as the wall is being built, because in the former case one cannot be quite sure that the soil is suitable, neither can the roots of the plants

be spread out so easily. In many cases, therefore, we should have to be content with smaller plants; but, on the other hand, the arranging of the plants on a wall already completed is much easier and requires less skill than arranging plants placed into the wall during its construction, The reason for this is that in the latter case it is more difficult to picture in one's mind what the completed group of plants would be like, and plants once walled in during the progress of wall building cannot be altered or rearranged without trouble.

Then, again, if the layers of wall stones are anything like of even thickness there will be a strong temptation to put the plants too much in lines. I always find it a good plan in such a case first of all to take a review of the plants at disposal, which are to be "built," so to speak, into the wall as the builder's work proceeds; then, secondly, on a piece of paper to make a rough sketch how these plants should be arranged, whether a group should be large or small, and where this or that colour should predominate so as to harmonise with the colour of the adjoining group; and, finally, where late or early flowering things should be, so as best to ensure succession of bloom. Such a sketch need not be elaborate, nor need it be drawn to scale. Let a dozen crosses represent, say, a group of a dozen

Aubrietias; twenty dots, say, a group of twenty Arabis, and so on. A few coloured crayons may help to facilitate distribution of colour, &c. Armed with such a sketch, however roughly done, we can feel sure of effects beforehand. The illustration will give an idea of the kind of sketch suggested.

Arranging Plants on a Wall already Built is much easier, though the planting is more difficult. In this case the sketch is not required. The best practical method I always find consists in having sticks and twigs of various sorts and sizes, which might be stuck into the wall to indicate where the plants should be put. For instance, a cluster of laurel twigs might be placed where we consider a batch of Alyssum would be most desirable, ordinary wooden labels might stand for a group of Campanulas, bamboo flower sticks for Helianthemum, &c. In this way we might arrange on the wall itself where the principal and most effective groups should go, and how the plants should be placed before anything is actually put in. When the arrangement of the sticks and twigs is complete stand back and look at it. We shall probably find that one group is too regular, another too small, and so on, and it will be a trifling matter to readjust the sticks to

our entire satisfaction, but it would not be so easy to rearrange the plants after they have once been properly planted. Neither would it be easy to judge of the effect by simply writing the names on labels or slips of paper and putting these into the wall.

When a dry wall has been carefully planted and the plants have become established it may still be thought desirable to increase the number of decorative plants by sowing seeds of annuals and perennials into some of the chinks and fissures or even some of the larger joints. Since this sowing of seed is practically the same for both dry walls and walls of masonry, I will deal with it in the next chapter when discussing the adornment of masonry walls.

CHAPTER XXVI

THE CONSTRUCTION OF WALLS OF MASONRY FOR WALL GARDENING

HAVING dealt with the most practical way of adorning "dry walls," both during building and after their completion, I will now consider walls of masonry, or, in other words, walls of stone or brick which have their joints filled with mortar or cement. These may be either retaining, terrace, or boundary walls. A retaining wall of masonry would most probably be not perpendicular, but slightly reclining against a bank or terrace. A boundary wall, on the other hand, would in most cases be quite upright. All such walls are, as a rule, intended as architectural rather than horticultural features, and their surfaces are therefore smoother and more even than those of dry walls. Especially are such masonry walls necessary when walls are required to be of such a height that a dry wall would have been unsafe. Sometimes, too, the immediate proximity of architectural or geometrical features, such as a house

steps, balustrading, a terrace, &c., would make it imperative that such a wall should present a more highly finished surface than would be possible in the case of dry walling. This would apply for the sake of harmony particularly to a terrace wall adjacent to and built of the same material as the dwelling house. Or, in another case, this terrace wall might be of such a height as to require being built on arches with the additional support of projecting buttresses.

In all such cases dry walling would be out of place, but it does not follow that we cannot use masonry walls for wall gardening. On the contrary, though the difficulties in adorning such walls are greater, we may nevertheless attain excellent results by planting them. Since it may not infrequently happen that wall gardening is being contemplated at a time when the house or adjacent terrace walls are being built, it would in such a case be possible to build a wall of masonry specially constructed to facilitate wall gardening without encroaching on the susceptibilities of the architect or the builder. I will therefore consider two kinds of masonry walls—viz. (*a*) those built with a view to wall gardening; (*b*) walls of masonry not built for wall gardens, but which might be adapted to that purpose.

Masonry Walls Built for Wall Gardening

There are naturally two kinds of masonry walls, viz., retaining walls, *i.e.*, which show one face only, and walls standing free and showing both sides. I will deal with the former first. Retaining walls are usually intended to keep up high banks of soil or terraces, and have therefore to be of great strength. Their original purpose is use rather than ornament, but that is no reason why they should not be adapted for the latter as well, without interfering with their stability.

The plants which are to adorn such walls must have something besides bricks and mortar to grow in, and if we can manage to cater for their requirements at the time when the wall is in course of construction this will be a great advantage, especially if we can make up our minds beforehand as to what kind of plants we would use and consider what soil would be best for them. As a guide I would strongly recommend a rough sort of sketch similar to the one illustrated in the last chapter. Whether such walls are to be of brick or of stone, or whether cement or mortar is to be used in the construction, generally depends on the strength required, and is therefore more a matter for the architect or the builder to decide. But if a choice can be made, stones would be preferable to bricks, as most plants are greatly benefited by

stones, and derive also a small amount of nourishment from this material, which in the burnt bricks would be absent; and if stability can be ensured by the use of mortar instead of cement, this would be an additional advantage to the plants. Even when circumstances demand that bricks and cement must be used exclusively we need not despair of growing plants on the wall if we make provision for them according to the following method.

Let us assume, then, that the builder has put in a good foundation below the level of the ground, and is now ready to proceed with that part of the retaining wall which will show above ground, and is to be, say, eight feet or nine feet high. In the first place it will be our duty to see that ordinary drain-pipes two inches or three inches in diameter are inserted into the foot of the wall, say three feet or six feet apart, and that when these drain-pipes have been walled in (sloping outwards), the space behind the pipes is filled in with loose stones, brickbats, or clinkers, as drainage. On some grounds the soil behind retaining walls of this kind often becomes water-logged, and with new work there is a danger of the whole wall collapsing in consequence of the increased weight of soil and water pressing against it.

I have tried to make my meaning clearer by the accompanying rough sketches, which, however,

must be taken as diagrams only and not as absolutely correct to scale. Sketch No. 1 shows a transverse section of such a retaining wall. *A* represents the original firm soil which has not been moved; *B* represents the body of new soil filled in as the wall is being built; *C* represents the loose stones or brickbats referred to, which are to act as drainage and convey surplus water through the drain-pipe *D*. The spaces *E*, *F*, *G*, *H*, *I*, and *J* show open channels filled with soil and communicating with the soil inside.

Sketch No. 2 shows the elevation of such a wall with the mouths of the drain-pipes (indicated by black circles) at the bottom, and with the openings for plants and soil at irregular intervals. For wall gardening the most important operation in the building of the wall is, of course, that of providing suitable soil, and this should not be left to the mason or builder, but should have the gardener's careful attention simultaneously with the builder's work. As the masonry progresses so the stones or bricks must be "backed up." Usually this is done by filling in brick rubble, dry clay, gravel, or rubbish of any kind, and ramming it firmly. But in this case the material must be good soil mixed with a few broken stones. Every now and then—preferably at irregular intervals, as shown in sketch No. 2—openings three inches to six inches wide are left in the wall, and these

likewise should be filled with good soil communicating with the greater body behind the wall. It is in planning beforehand what to plant that we may greatly facilitate the gardener's work in placing this or that kind of soil according to the requirements of the plants—say, for instance, peat or leaf-mould where we would have Ramondias, *Gaultheria procumbens*, *Polygala chamæbuxus*, Ferns, &c.; stony soil, preferably mixed with limestone chippings or old mortar, for such decided lime-lovers as Scolopendrium, Dianthus, &c. It may seem a little troublesome to take all this precaution, but every lover of plants knows that planting at haphazard into unsuitable soil cannot be conducive to success. Besides this, we must bear in mind that the application of this or that kind of soil can never be attended to with quite the same facility as at the time when the wall is being built.

But, whatever soil is used, one thing is most essential, and that is well ramming it down—not only behind the wall, but also in the openings left for the plants. The soil must be so firmly rammed that there would be no danger of its settling down afterwards and leaving hollow spaces, which would be a source of danger to the plants and a great delight to slugs and snails. The actual distance between the openings on the face of the wall must, of course, greatly depend

on the plants to be used and the room these would require to show to their best advantage, but it is also necessary to have regard to the stability of the wall, as naturally it must be weaker in proportion to the number of openings.

THE PLANTING OF A RETAINING WALL

constructed of masonry on the lines mentioned is comparatively easy, but requires some careful finishing touches. Assuming that the wall was built in accordance with all the suggestions given above, that the openings are about four inches to six inches across, and that they were filled with soil as directed, we next proceed to the work of planting. Well-established plants in pots with a good ball of roots are infinitely better and more likely to succeed than those only recently divided. I have often seen walls, constructed with openings in the way I have mentioned, which were planted by the simple expedient of pushing the plant sideways into the hole in the wall, filling a little more soil around the roots, and the operation was considered finished in a satisfactory manner. Now, such planting might do in the case of some coarse-growing plant with a long tap-root, which it would be almost impossible to kill, but choicer plants would surely die if planted in that manner. This is what would happen: The first shower of rain or the first application of the

watering-pot would wash away a considerable portion of the newly-placed soil, however firmly it might have been rammed. Possibly the next rain would be heavy, beating direct into the opening and washing away still more soil, till the roots would be almost bare and the plant sicken and die.

A much better plan is to have at hand a number of broken bits of the same material as that of which the wall was built, either white bricks, red bricks, or stones, as the case may be, and to use these for entirely closing the outside of the opening into which the plant was put, without, however, preventing moisture from having access to it. This is done as follows: Flat fragments of stone (or small pieces of brick as the case may be) are placed at the bottom of the opening. A thin layer of soil is then so placed as to slope inwards, *i.e.*, towards the interior of the wall, and on this the plant is placed with its crown slightly protruding from the face of the wall. When the plant is thus in proper position its roots are surrounded by suitable soil, which is well rammed and gradually filled in till the front of the opening is reached. Now comes the most important part of the operation, namely, that of filling up the whole opening all round the plant in such a way that it is tightly wedged in and no soil can be washed out, although rain or other water could get to the plant and even soak through to its roots.

The actual operation of filling up the opening is best described as the building of a miniature dry wall all around the plant, using a layer of soil, say, half an inch thick over every course of small stones or small pieces of brick perhaps two inches or so in thickness, and rather flat in shape so as to rest firmly on each other. Wedge-shape pieces, too, are very useful, as they can be driven in firmly, and are then not likely to shift afterwards. When the whole of the openings have thus been filled out flush with the face of the wall they will, seen from a little distance, appear as part of the wall itself, and in a year or so, when the plant would have attained a larger size, it would completely cover this miniature dry walling, which latter would then be invisible even on the closest inspection. This method of planting not only ensures the well-being of the plants, but since the surface of the wall was made good it will be impossible to tell that holes and openings were left on purpose, and the presence of the plants on the face of the wall will appear like an accident rather than design, and this is as it should be.

In illustration No. 3 a rough sketch is given showing a section of a free upright wall of masonry constructed with a view to wall gardening. It has openings in precisely the same manner as retaining walls, and is built on the principle of

CHAPTER XXVII

WALLS OF MASONRY NOT BUILT FOR WALL GARDENING BUT WHICH MIGHT BE ADAPTED TO THAT PURPOSE

In the last chapter I mentioned walls of masonry specially built with a view to wall gardening, and I explained how during the building operations openings might be left for soil and plants. I will now deal with walls that were never intended for wall gardening, but might be adapted to it.

The great difficulty presented by such walls is naturally the provision of nourishment for the plants. In a wall built purposely for wall gardening soil can be introduced and varied according to the nature of the plants to be used ; but in the case of a wall built entirely with stones or bricks, with either cement or mortar joints, and apparently without a particle of soil, this would be more difficult. That it is possible, nevertheless, to grow plants on such a wall is proved every day, if we take the trouble to examine old walls or old ruins which have become clothed with

vegetation without the aid of man. The plants may be weeds or common Ferns only—sometimes they may even be trees or large bushes; but, whatever their nature may be, they have become firmly established, and by their luxuriant appearance they prove to us that plant life is often possible under seemingly adverse circumstances.

Old Walls of Masonry

The masonry walls best suited for wall gardening are very old retaining walls, the older the better. The reason for this is not far to seek. A retaining wall always contains more moisture than a wall standing by itself with both faces exposed, and the former, therefore, becomes covered with natural vegetation of some kind or other much quicker than the latter. In order to glean a useful lesson from Nature, we shall do well to observe how a masonry wall becomes naturally clothed not only with creepers, but with plants of all kinds springing from the joints. Probably the first kind of vegetation on an old wall would be Moss, which year by year increases until it forms quite a thick coating, not only over the joints, but probably also over a portion of the stones or bricks. If the position should be a moist and shady one, this partial coating with Moss would be much accelerated. But even a

dry, sunny wall left to itself does not remain entirely bare very long. Owing to lack of moisture, Moss would not form so readily as on the moist and shady side. But there would probably be a very thin coating of some kind of Moss formed during the wet season, but which would shrivel and die during the summer.

Lichens of various kinds, however, would in the course of time grow even on the sunny side, and beneath and between them dust would accumulate, carried there by wind or rain. Of the Moss, too, small portions would annually decay, forming a thin layer of humus. Into these minute cushions, formed of a mixture of dust, grit, decaying vegetable matter, and humus, seeds may by chance have been deposited by the agency of birds or wind. The moisture caused by rain or dew would make these seeds adhere to the Moss or Lichen, where probably they would soon be covered by a fresh accumulation of dust. Soon they would germinate, and in the struggle for existence the fittest would survive.

It is generally by such means as these that walls first become clothed with plants naturally. The plants may be only annuals, and, if so, they would die at the end of the season; or, if they are perennial, they may die through want of nourishment eventually, but their decaying roots which had already penetrated into the joints or

into the stone pave the way for the next generation of plants, whose roots will speedily absorb what was left of its predecessors, and will go still deeper into the wall, until they in their turn will have to give way to plants of a still more robust nature asserting themselves.

Now the lesson thus taught by Nature is well worth our attention, since it is an excellent guide, and may prevent grievous blunders. It teaches us above everything else that the process of establishing plants on existing walls must be a very gradual one. Immediate effect is possible when a wall is specially built for wall gardening, but on an ordinary masonry wall, either old or new, immediate effect in the proper sense of the word is an impossibility. Let us imagine that we have to do with an old masonry wall. The owner has read somewhere that it is possible to convert such a wall into a perfect picture of beautiful plants. He has a number of holes knocked into the face of the wall, fills these holes with soil, buys a nice lot of strong, well-established plants, has them planted into the holes, and—waits for the picture. The picture never appears. One by one the plants die, till not one is left to tell the tale. Why? Because for strong plants the sudden change from more congenial surroundings to the narrow confines of a hole in a wall is not reasonable. When our wall garden is

formed by a "dry wall" with soil between the stones, or when we are able to put in plants and stones simultaneously as the wall is built, then by all means let us use the strongest plants we can get. If properly planted they will be safe, because there is plenty of root space provided for them and plenty of soil for them to feed on. But when we have to deal with a masonry wall, success can only be obtained by using either the smallest of plants or seeds only.

CHAPTER XXVIII

PREPARING AN OLD MASONRY WALL FOR SEEDS AND PLANTS

In preparing a wall of masonry for either sowing or planting the utmost care and consideration are required. In the first place it will be necessary to clear the wall of weeds. Such wild plants as Primroses, *Linaria Cymbalaria*, small Ferns, &c., are best left undisturbed. There could be no objection to them, but the coarser weeds must be cleared and their roots pulled up. This is best done by using a long chisel or short crow-bar. Where we wish to have plants the joints between the stones or bricks may be "raked out," removing as much of the mortar as can be done with safety. Sometimes a small stone or brick may even be removed altogether, provided the stability of the wall is not endangered by such a proceeding. In other places an iron pin may be used, driving it in repeatedly until quite a deep hole is made. When the old wall is already covered with Moss and Lichens it would not be

advisable to clear away more of this than can possibly be helped. Moss and Lichens, either decayed or growing, are, as I have already shown, Nature's first steps towards clothing a wall with vegetation. To remove mortar from the joints in such a way as to destroy also the Moss or Lichens adhering to them would, I think, be a very grave mistake. Where joints are so covered it would be best not to remove any mortar at all by means of chisel or crowbar, but simply to make narrow, deep holes by driving in the iron pin referred to till a depth of 6 inches or so has been secured. These holes, which need not be more than half an inch or an inch in diameter, should then be filled with a mixture of chopped sphagnum moss and soil, which by means of a small stick should be rammed in firmly without disturbing the natural Moss, &c., outside.

In the same way the larger spaces, where more of the mortar was removed and where deeper holes were cut, should be filled in with good soil and sphagnum moss, but here it will be necessary to make provision for preventing the soil thus introduced from washing out again with the first shower of rain. For this purpose small wedge-shaped bits of stones, brickbats, or even bits of slate are driven into the joints both before and after sowing or planting. It is essential that some of these tiny stones, &c., should slightly project

and be tilted backwards. By this means moisture is assured. The little projections need not extend more than half an inch or so, but even this will suffice to collect drops of water flowing or trickling over the surface of the wall either during rain or condensed during fog or mist. The backward tilt of these fragments of stones, &c., will convey water thus collected to the interior of the wall, and will help considerably in feeding the plants.

Sowing and Planting

Having duly prepared our masonry for sowing and planting in the manner described, our next care will be the adornment. Putting large plants in a masonry wall is not practicable, and in ninety-nine cases out of a hundred would only result in failure. The best way, therefore, would be to raise plants from seeds, sowing them in boxes, &c., and then pricking off the young seedlings into the prepared wall, taking care that each tiny plant is properly placed, and that the little bits of stone, which should be pressed in around the plant are so secured that neither stones nor soil can be washed out of the joints. It is necessary also to see that the wall is kept thoroughly moist until the tiny plants can take care of themselves.

means for ensuring the successful clothing of a masonry wall. The operation of sowing must vary according to circumstances. If the wall is already partly covered with Moss, &c., which would allow the seeds to adhere, we might form a kind of paste consisting of a little old cow manure and loam mixed with the seeds, and thinned with water as required. This paste by means of a small stick is worked into the Moss or between the Lichens, and if kept moist and slightly shaded the seeds will soon germinate.

In the case of very narrow joints or holes made with an iron pin and then filled with soil, as above described, the best way of introducing the seed would be in the shape of a "pill." Seeds, sphagnum moss, and loam are mixed together and then rolled into "pills," which are poked into the prepared joints or holes and secured by small fragments of stone. Larger joints or larger holes are differently treated. In this case it is best to make a sort of general mixture of seeds, Moss, and loam, and then with a stick to ram it gently into the previously prepared places, again finishing off with small stones, &c., hammered firmly into the joints. April is an excellent time for this operation.

When the seeds have germinated and the

young plants appear it is best not to do much in the way of thinning out, as by pulling up some of the plants others might be endangered, and the small stones which we drove in so carefully would be disturbed. It is far better to mix the seeds very thinly with the soil or sphagnum moss in the first place. It goes without saying that walls so treated will require constant attention until the plants have become established, but on the whole it will be found the only really satisfactory way of adapting masonry walls to wall gardening. In concluding this chapter I will say a few words on

New Masonry Walls

How to build walls of masonry with a view to wall gardening has already been mentioned, but it sometimes happens that new walls are built in the ordinary way, and that the idea of adapting them for wall gardening is an after-thought. I may say at once that wall gardening under such circumstances is difficult, to say the least of it. Much depends, of course, on the wall and the purpose for which it was built. If it is in itself an architectural feature in keeping with the design of the house, it would be almost an act of vandalism to knock holes into such a wall. Wall gardening is excellent in its way, but like

everything else it must have its limits, and cannot be applied successfully to every wall. Apart from the difficulties of growing plants in a new wall, it would often have been far better to leave such a wall alone or to cover it with the creepers that would not interfere with its architectural design. Walls, on the other hand, which are in themselves of no ornamental value—perhaps even ugly and obtrusive—would gain in appearance by being used for wall gardening. In adapting such new walls for that purpose, much that has been said about the preparation of old walls would apply to the new. There are some differences, however. One of them is the utter absence of Moss, Lichens, or other material which in the çase of an old wall would facilitate the germination of seeds or favour the young plants in becoming established. Another difference is that the mortar would be soft instead of hard. In one sense this would be an advantage, insomuch that portions of it could be removed with greater ease in those places which we wish to plant; but, on the other hand, the removal of too much mortar in a new wall might endanger the stability of the latter, and plants resent newly-slacked lime or fresh cement.

If such a wall is to be used for wall gardening, the best treatment would be to make the holes as large as can be done with safety, filling them with

good soil, secured by small stones, as described in connection with old walls. Putting plants into such walls is out of the question. As a rule it would only prove waste of time, but by using seeds only in the way I pointed out when writing of old walls it will in most cases be successful, provided the young seedlings receive the necessary care in watering and partial shading.

A DRY WALL AT LISKEARD.

CHAPTER XXIX

EXAMPLE OF DRY WALL PROPERLY PLANTED

In previous chapters on wall gardening I have urged the necessity of grouping the plants on the wall as irregularly as possible, and I have also given sketches illustrating the distribution. By the kindness of Mr. L. C. Foster, of Trevillis, Liskeard, I am now able to give a still better illustration by means of a photograph showing wall plants well grouped and in a most flourishing condition.

The wall here illustrated is a boundary one. One side of it is therefore perfectly plain, but the side facing the garden has been made bright and cheerful with all kinds of wall plants, which were put in simultaneously with the stones. I have already stated that this method of putting in stones and plants at the same time is by far the best, and the flourishing condition of the plants shown in the picture is a further striking proof. When the wall is being built it is much easier to provide proper soil for the roots and to spread

out the latter in a better manner than can be done afterwards. Great benefit, too, is derived from the fact that the stones press close against the soil in the joints, which are thus kept cool and moist. The wall here depicted was built of Cornish granite, which is an excellent material for the purpose. Now and then small stones judiciously introduced prevent the larger ones from pressing too heavily upon the roots of the plants, which nevertheless can have plenty of space to run into the interior of the wall, where soil instead of mortar was used.

The picture shows, of course, only a very small portion of this wall. The most conspicuous plants visible are Aubrietias, Ferns, and mossy Saxifrages. A great variety of Sedums, Sempervivums, Alyssum, Pinks, &c., have also been introduced, and will materially help in prolonging the season of flowers on the wall.

CHAPTER XXX

PLANTS FOR ROCK AND WATER GARDENS

The following is a list of plants that are suitable for rock and water gardens.

Spring

Adonis amurensis ⎫
,, ,, fl. pl. ⎬ yellow.
,, pyrenaica ⎪
,, vernalis ⎭
Alyssum (Madwort), saxatile.
,, in variety, yellow.
Androsace carnea, pink.
,, arachnoidea, white.
,, sarmentosa Chumleyi, rose.
Anemone (Alpine windflower) alpina, white.
,, ,, ,, ,, sulphurea, yellow.
,, ,, ,, apennina (apennine), blue
,, ,, ,, ,, alba, white.
,, blanda, blue.
,, ,, alba, white.
,, cypriana, white and blue.
,, scythinica, ,, ,, ,,
,, Hepatica in variety.
,, Wood anemone (A. nemorosa) in variety.
,, nemorosa Robinsoniana in variety.

Anemone ranunculoides, yellow.
„ Pulsatilla (Pasque flower), purple.
„ „ alba, white.
„ vernalis, white and purple.
Arabis albida (Rock-Cress), white.
„ „ variegata.
„ aubrietioides, rose.
„ Billardieri, rose.
„ lucida variegata, white.
Arnebia (Prophet-flower), echioides, yellow.
Aubrietias—numerous, but especially fine are Craven Gem, tauricola, deltoidea grandiflora, Leichtlini, Dr. Mules, Fire King, Moerheimi, and Souvenir de Wm. Ingram.
Cheiranthus (Wallflower), Allioni, golden yellow.
„ alpinus, yellow.
„ marshalli, golden.
Chionodoxa Luciliæ (Glory of the snow), blue.
„ „ alba, white.
„ sardensis, deep blue.
Cyclamen Atkinsi, white and crimson.
„ album, white.
„ roseum, rose.
„ coum, deep rose, c. album, white.
Dodecatheon (American Cowslip), Jeffrayanum, rose.
„ „ „ Meadia, many varieties.
Draba aizoides }
„ Brunæfolia } yellow.
„ gigas }
„ pyrenaica, rose.
Epigæ repens (mayflower), rose.
Erinus alpinus, reddish-lilac.
„ „ albus, white.
Erysimum pulchellum, yellow; E. rupestris, yellow.
Fritillaria (Fritillary) aurea, golden; F. pudica, golden; F. recurva, orange-scarlet.
Gentiana (Gentianella) acaulis, blue; G. verna, blue.
Haberlea rhodopensis, purple; H. virginalis, white.
Hyacinthus azureus, blue.
Iris, many beautiful species, among which are the Netted

Iris (I. reticulata), cristata, Heldreichi, Histrio, histrioides, Bakeriana, iberica, persica, Tauri.

Megasea (large-leaved Saxifrage) ciliata, white; cordifolia, pink; C. purpurea, rose-purple; Stracheyi, pink.

Morisia hypogæa, yellow.

Myosotis (forget-me-not), azorica, blue; dissitiflora, blue, rupicola, the same as alpestris, blue with yellow eye.

Narcissus minimus, Bulbocodium (hoop-petticoat), cyclamineus, triandrus, which are, with the exception of the three first named, yellow, the last-mentioned, cream.

Omphalodes (Spring navelwort) verna, rich blue.

Phlox amœna, pink; subulata (many varieties); nivalis, white; reptans, rose; stellaris, rose.

Pulmonaria (Lungwort) angustifolia, blue; auvernense, deep blue; Mollis, blue; saccharata, rose to blue.

Ramondia (Rosette Mullein) Nathaliæ, bluish-violet; pyrenaica, purple-mauve; pyrenaica alba, white; serbica, mauve.

Saxifraga (Rock-foil or Saxifraga) apiculata, yellow.

„ a. Maylii, yellow.

„ aretioides, yellow.

„ Boydi, yellow; B. alba, white.

„ Burseriana, and Burseriana major, white.

„ Elizabethæ, soft yellow.

„ Fergusonii, pink.

„ juniperina, yellow.

„ Ferdinandi Coubourgi, deep yellow.

„ Grisebacki, crimson.

„ marginata, white.

„ oppositifolia in variety.

„ Rhei, pale-pink; superba, pink; Guildford Seedling, crimson.

„ Salomoni, white.

„ sancta, yellow.

„ Valdensis, white.

„ Wallacei (composi), white, and there are many mossy kinds, such as S. hypnoides.

Shortia galacifolia, white.

Thalictrum anemonoides, white.

Tiarella cordifolia (Frame flower), creamy-white.

Summer

Acæna argentea, brownish-white; Buchanani, red; glauca, red; Nova-Zealandica, crimson.

Acantholimon (Prickly thrift) androsaceum, crimson; glumaceum, rose; venustum, pink.

Achillea (Milfoil) argentea, white.
,, ,, Clavennæ, ,,
,, ,, * Huteri, ,,
,, ,, rupestris, ,,
,, ,, * sericea, ,,
,, ,, tomentosa, yellow.
,, ,, * umbellata, white.

* Those marked with an asterisk have white or silvery foliage.

Æthionema coridifolium, soft-rose
,, grandiflorum, rose-pink.
,, persicum, rose-lilac.

Ajuga (Bugle), Brockbankii, blue.
,, ,, genevensis, ,,
,, ,, reptans in variety.

Alyssum (Madwort) argenteum, yellow.
,, ,, montanum, ,,
,, ,, pyrenaicum, white.
,, ,, wierzbickii, yellow.

Androsace argentem, white.
,, Chamæjasme, white.
,, cylindrica, white.
,, foliosa, pink.
,, lanuginosa, rose-pink.
,, ,, Leichtlini, white and pink.
,, pubescens, white and yellow.
,, pyrenaica, white.
,, sarmentosa, rose.
,, villosa, white with red eye.
,, vitaliana, yellow.

Antennaria dioica tomentosa, yellow.

Anthyllis montana, pink.

Aquilegia alpina }
,, cærulea } blue.
,, glandulosa }
,, Stuartii }
Arenaria balearica, white.
,, montana, ,,
,, purpuracens, purplish.
,, tetraquetra, white.
Armeria alpina, rose.
,, cephalotes alba, white.
,, ,, rubra, red.
,, laucheana, red.
Asperula odorata, white.
Aster alpinus, blue.
,, ,, albus, white.
,, ,, ruber, red.
,, ,, speciosus, blue.
Astragalus hypoglottis, purple.
,, ,, alba, white.
,, Allioni, blue.
Campanula cenisia, pale blue.
,, Collini, violet.
,, G. F. Wilson, violet.
,, garganica, pale-blue.
,, ,, alba, white.
,, grandiflora Mariesi, violet.
,, Hendersoni, mauve.
,, Haylodgensis, pale-blue.
,, muralis, blue.
,, ,, major (bavarica), blue.
,, Profusion, slate-blue.
,, palloides, purple.
,, pulla, satin-purple.
,, pumila, blue.
,, ,, alba, white.
,, Raineri, blue.
,, Waldsteiniana, pale-blue,
,, Zoysii, pale-blue, very distinct.
Cerastium Bierbersteinii, white.

Cerastium glaciale, white.
Cornus canadensis, white.
Coronilla iberica, golden.
Corydalis lutea, yellow.
Crucianella stylosa, pink.
Cyananthus lobatus, blue.
Daphne Cneorum, rosy-red.
,, rupestris, rose-pink.
Dianthus alpinus, reddish-pink.
,, albus, whitish.
,, arenarius, white.
,, atrarubens, red.
,, callizonus, reddish.
,, cæsius, rose-pink.
,, catalpinus, rose-carmine.
,, cruentus, crimson.
,, deltoides, pink.
,, ,, albus, white.
,, glacialis, rose-crimson.
,, neglectus, carmine.
,, suavis, pink.
,, sylvestris, clear pink.
,, ,, albus, white.
Dryas Drummondi, yellow.
,, octopetala, white.
Edraianthus dalmaticus, violet.
,, Pumilio, purple.
,, serpyllifolius, purple.
Epimediums (in variety), for shade or sheltered places.
Erigeron (Fleabane) alpinus, blue.
,, aurantiacus, orange.
Eritrichicum nanum, blue.
Erodium hymenoides, white and pink.
,, macradenium, white and rose.
,, Reichardi, white.
,, trichomanæfolium, white, veined with crimson.
Gaultheria procumbens, scarlet fruits, a little evergreen shrub.
,, tricophylla, scarlet fruits also.

Gentiana acaulis, blue.
,, Andrewsi, blue.
,, bavarica, ,,
,, brachyphylla, blue.
,, Favrati, deep blue.
,, septemfida, blue.
Geranium argenteum, white.
,, cinereum, white and rose.
,, sanguineum, white and rose.
,, ,, album, white.
,, lancastriense, pink.
Globularia cordifolia }
,, nudicaule } blue.
,, tricosantha }
Gypsophila cerastioides, white.
,, prostrata, ,,
,, repens, ,,
Horminum pyrenaicum, blue.
Houstonia cærulea, white.
Hutchinsia alpina, white.
Hypericum reptans, golden yellow.
Iberis correæfolia, white.
,, petræa, white.
,, sempervirens, white.
and others.
Incarvillea grandiflora, crimson.
Isopyrum thalictroides, white.
Leonotopodium (Edelweiss) alpinum.
Linaria (Toadflax), alpina, purple-blue.
,, ,, hederacea, blue.
,, ,, hepaticæfolia, violet.
,, ,, pallida, violet-purple.
,, ,, pilosa, blue.
Linnæa borealis, pink, requires shade, and peat soil.
Lithospermum (Gromwell) canescens, yellow.
,, ,, Gastoni, white and blue.
,, ,, graminifolium, blue.
,, ,, prostratum, ,,
,, ,, rosmarinifolium, blue.

Lychnis (Campion) alpina, pink.
„ „ Lagascæ, pink.
Meconopsis (Welsh Poppy) cambrica, yellow.
Morisia hypogæa, yellow.
Myosotis (Forget-me-not) alpestris, blue.
„ („) rupicola, azure-blue.
Nierembergia rivularis, white.
Œnothera (Evening Primrose) eximia, white.
„ „ missouriensis, yellow.
Omphalodes (Navelwort) Luciliæ, very soft blue.
Ourisia coccinea, scarlet.
Oxalis enneaphylla, white.
„ lobata, golden yellow.
Opuntia monacantha.
„ missouriensis.
„ Rafinesquii.
„ vulgaris.
The opuntias are for hot and dry places, where the soil is poor and stony.
Papaver (Poppy) alpinum in variety.
Parochætus communis, blue.
Pelargonium Endlicherianum, rose.
Pentstemon cæruleus, blue.
„ glaber, blue.
„ pubescens, pale purple.
Petrocallis pyrenaica, pink.
Phlox amœna, rose.
„ divaricata, blue.
„ canadensis, „
Phyteuma comosum, blue.
„ orbiculare, „
Pinguicula (Butterwort) alpina.
„ „ grandiflora.
Both these are suitable for damp rocks.
Potentilla alpestris, yellow.
„ ambigua, „
„ aurea, yellow.
Primula (Primrose) calycina, purple.
„ „ capitata, deep purple.

Primula (Primrose) Decorum, crimson.
" " farinosa (Bird's-eye), lilac.
" " integrifolia, rose-crimson.
" " involucrata, white.
" " luteola, yellow.
" " marginata, lilac-blue.
" " megaseæfolia, magenta and crimson.
" " rosea (Himalayan), scarlet and rose.
" " scotica, purple.
" " tyrolensis, rose-purple.
" " viscosa, purple-rose.
" " nivalis, pure white.
Ranunculus (Buttercup) amplexicaulis, white.
" " alpestris, white.
" " glacialis, white or rose.
" " gramineus, yellow.
" " parnassifolius, white.
" " pyrenaicus, white.
" " rutæfolius, milk-white.
The Alpine Ranunculi are among the most charming of the Buttercups, the mere colour term affording no idea of their beauty.
Saponaria (Soapwort) ocymoides alba, white.
" " splendens, crimson.
Saxifraga (Rock-foil), aizoides, yellow.
" " aizoon balkana, white.
" " " flavescens, yellow.
" " " lutea, yellow.
" " " rosea, rose.
" " " rosularis, white.
" " autumnalis, orange.
" Camposi, white.
" cochlearis, "
" " major, white.
" " minor "
" Cotyledon, white.
" " Icelandica, white.
" " pyramidalis, "
" Hostii, white, with reddish spots.

Saxifraga Lantoscana, white.
" " superba, white.
" longifolia, big white panicles.
" Macnabiana, white with reddish spots.
" mossy kinds in great variety, these have white flowers for the most part.
Statice bellidifolia, blue.
" examinea, pink.
Silene (Catchfly) acaulis, pink; and alba, white.
" " alpestris, white.
" " maritima, galena, white.
" " Schaftæ, red.
Thymus (Thyme) lanuginosa.
Tunica Saxifraga, flowers white to pink.
Tulipa (Tulip) kauffmanniana, white and gold.
Tropæolum (Nasturtium) polyphyllum, yellow.
Veronica Allioni, blue.
" prostrata, blue.
" rupestris, "
" saxatilis, "
Zauschneria californica, scarlet.

Autumn

Acis autumnalis, shade of pink.
Anthyllis montana, pink.
Arnebia (Prophet-flower), yellow.
Atragene alpina, violet.
" " alba, white.
Campanula (Bellflower) garganica, pale blue.
" " " alba, white.
Colchicum autumnale, purple; a. album, white; a. plena, white; speciosum, purple; s. album, white.
Coronilla iberica, yellow.
Corydalis lutea, yellow.
Crocus speciosus, violet-purple.
" nudiflorus, lilac-purple.
" ochroleucus, cream.
" zonatus, lavender.

Cyclamen neapolitanum, rose-pink ; album, white.
Galanthus (Snowdrop) nivalis octobrensis, white.
Mazus Pumilio, purplish.
Plumbago Larpentæ, blue.
Polygonum (Knotweed) Brunonis, pink.
,, ,, sphærostachyum, crimson.
,, ,, vaccinifolium, rose.
Pterocephalus Parnassi, pink.
Saxifraga Fortunei, white.
Sedum (Stonecrop) Ewersi, pink.
,, ,, kamschaticum, yellow.
,, ,, variegatum, ,,
,, ,, pulchellum, pink.
,, ,, Sieboldi, ,,
,, ,, spectabile, ,,
,, ,, ,, atropurpureum, pink.
,, ,, spurium in variety, pink and red.
Spigelia marylandica, crimson and red.
Sternbergia lutea, yellow.
,, angustifolia, yellow.
,, ,, major, yellow.
,, macrantha.
Stokesia cyanea, blue.
Vittadenia australis, white.
Zauschneria californica, scarlet.
,, ,, splendens, scarlet.

Winter

Adonis amurensis, yellow.
Colchicum crociflorum, white and purple.
Crocus ancyrensis, orange.
,, biflorus, white and lilac.
,, Imperati, violet and fawn.
,, Sieberi, lilac-purple.
,, ,, versicolor.
Cyclamen libanoticum, rose.
,, cilicicum, white and purple.

Eranthis (Winter Aconite), yellow.
„ cilicus, yellow.
Galanthus (Snowdrop), all.
Helleborus niger (Christmas Rose), in many forms.
Hyacinthus azureus, blue.
Iris alata, pale blue.
„ bakeriana, blue and white.
„ Danfordiæ, yellow.
„ persica, white and pale-blue shades.
„ „ Tauri, velvety-purple.
„ reticulata, in variety, the flowers violet and gold.
„ stylosa, pale blue; alba, white; speciosa, pale blue.
Saxifraga apiculata, yellow.
„ Boydii alba, white.
„ burseriana, „
„ „ major, white.
„ Ferdinandi Coburgi, golden-yellow.
„ Grisebachi, crimson.

N.B.—In the foregoing lists of plants suitable for the rock garden, it may be observed that a few names occur in more than one season. This is due to the long season of flowering. In all cases the times of flowering can only be regarded as approximately correct, so much depending upon position, locality, and the varying seasons.

CHAPTER XXXI

WATER GARDENS

When the history of gardening in the present century is written, a distinct era will be formed by the introduction of the hybrid Nymphæas from English and foreign raisers, hybrids that have brought to the lake and pond surface the glorious colouring of the species of tropical climes. Their acquisition is a precious gain, and has transformed many an ugly lake into a garden of living beauty, with flowers of rich and tender colours, as delightful as anything in the hothouse and conventional "summer bedding."

Those who have not considered the lake surface as providing a place for a beautiful garden should introduce the water-lilies, remembering that the hybrids are thoroughly hardy, equalling in vigour and frost-resistance the white lily of our ponds and river back-streams. In many an otherwise interesting garden a needless blot is the lake, as bare of flower life generally as a gravel path, but capable of rich effects through the summer

and autumn from the hybrid Nymphæas, which form big floating groups, jewelled with masses of petals, varying in their colouring from deepest blood-red to pure white, the plants showing too as great a diversity in growth. Some of the pretty miniature Nymphæa pygmæa and allied forms, are for the margin and lead up to those remarkable hybrids, the Marliacea set—albida, Chromatella, carnea, and to other beautiful forms that are enumerated on another page.

The water-lilies are happier in a sheltered quiet lake than in quite open water, and they are not flowers for the large domain merely, but for gardens of even moderate dimensions, where they are more under control than in extensive lakes, infested with rats and other enemies of water flowers in general and Nymphæas in particular. In a sheltered and yet not overshadowed lake, the plants make rapid growth, and bloom with wonderful freedom through the summer into the cool autumn days making fuller development impossible.

It is a pleasurable sensation to seek the water garden when the great leafy groups bear their rich burden of flowers, open wide in the sunlight, and begemming the surface with masses of yellow, crimson, glistering white, deep red, and innumerable shades. The flower gardener who undertakes the growth of the plants for the first time need

not fear that failure will result from embarking in this recent phase of English gardening, as with exceptions the plants are hardy and strong in growth, and the flowers may be gathered for table decoration, thus fulfilling a novel and delightful mission in the house itself.

But it is not profitable to try experiments with species not hardy, or at least their hardiness must be proved by persistent trials in various positions. The species that have imparted so richly their colouring to the hybrids are not for the open garden, unless in some favoured spots, which cannot be accepted as general conditions for Nymphæa culture. Interesting, it is true, is this experimental gardening—growing outside the beautiful water-lilies of warmer lands than our own, but they possess more of the hardiness of the hybrids. Where no pond or lake exists, one may grow the smaller forms in tanks and tubs, and thus add appreciably to the interest of the garden.

Water gardening is not confined to the Nymphæas. The water margin should be also a garden of flowers, and not some ugly stone, brick or cement edge, which of course renders flower life impossible. In not a few gardens and parks some ugly stone is considered sufficiently interesting and beautiful as a margin to the water. A world of flowers is thrust aside when the oppor-

tunities of introducing moisture-loving plants are not regarded—plants that provide a procession of flowers from early spring until the threshold of winter—the Irises, the larger Spearwort (*Ranunculus Lingua*), the globe flowers, Japanese Primrose, and kinds that live in the water, Buckbean, Arrowhead, and a host of things that occur to mind when thinking of the beauty of some natural stream coloured with the flowers that are only happy in moisture. There should be, too, a good grouping of Bamboos, grasses, and plants of bold growth—Polygonums and such-like.

The Nymphæas (Water-lilies)

Nymphæas, or Water-lilies, which a decade or so ago were practically unknown in British gardens, are at the present time among the most admired flowers of the year; while, thanks to the remarkable race of hybrid varieties evolved by M. Latour Marliac, Temple-sur-Lot, France, not only has a new interest been created in these and allied plants, but the neglect of one of the most important phases of open-air gardening is a thing of the past. Before the appearance of this novel and beautiful race of plants, the chief interest of the hardy water-lilies of our own land was centred in the yellow Nuphars and the white water-lily, Nymphæa alba, neither of which was

made much use of in the garden, but were more frequently seen about the back-waters of our rivers. To-day, however, and for years past, all this has been changed, and we have now a race which for beauty of colour and variety merits the highest praise we can bestow. Moreover, to the great attributes of beauty and variety must be added the still greater ones of perfect hardiness and simple cultural requirements, without which these plants could never have attained to their present universal popularity. It is these latter attributes indeed that have caused them to be grown far and wide, and to have found for them a place in lake and pond in some of the most famous gardens of the land. That they have proved worthy, as well as beautiful additions to our gardens, such notable instances as the gardens at Gunnersbury and Gravetye Manor, amply testify. And in each of these they have not merely justified their introduction by reason of an ornamental value and beauty, but by their free growth and ready increase have made their cultivation easy on quite a large scale. In short there is neither lake nor pond, large or small, natural or artificial, that need be without its complement of these plants, while those who are not the possessors of extended water areas may grow not a few of the beautiful kinds in pond or pool, fountain basin or tank; while even a tub may be

made to contain a solitary example if a little care and attention be bestowed upon it. Happily in whatever way they are grown, the plants present few if any difficulties to the cultivator, though in the larger water areas they are liable to be attacked by the water-rat and moorhen, both of which play much havoc with the flowers and leaves of these plants. From the point of view of general culture it should be noted that the Nymphæ delights, like all other aquatic plants, to have its roots in the rich mud deposit of lake or pond; hence, where it is intended to plant them in the artificially made pond, fountain-basin or the like, care must be taken to supply the plants with the necessary soil. The usual deposit of the natural lake is clay and that wealth of vegetable matter which has drifted thereto or is in other ways inseparable therefrom. Hence, in making soil provision for the plants in the artificial pond, a fair percentage of heavy or clayey loam should be used, together with a little old vegetable matter, or similar material. The supply of this need not be great, and may range from a bushel or two to the third of a cart-load.

Planting

This should be done in the spring, April and May being the best time. The work of planting is of the simplest description, and the plants

having been placed in a wicker-basket or piece of old sacking with soil for ballast to weigh them down may be dropped into their required positions. We have, indeed, dispensed with even these, and by merely securing a brick to the plant dropped it into the water to find its own place, In dealing with the artificially arranged pond the soil positions would require to be marked so that the plants may be rightly placed. In employing sacking for enclosing the plants the material should be somewhat old so that the new roots may the more easily get away. It is also important that the growing-point of the rhizome or root-stock be visible, as the more quickly this can emerge and produce the new section of the extending rhizome, the more quickly will the new root-fibres take hold of the soil. A good average water-depth for the plants is two or three feet—it may be less or more without adding to or detracting from the success or the vigour of the plants; indeed, we have known them to do well in eight feet of water, and at one-fourth of this depth also. In this connexion it should be remembered, however, that a time will come when division and replanting will be required. Certain difficulties may present themselves, such as lowering the water for the purpose or recharging the lake or pond. Thus it will be better to avoid extreme depths of water, and indulge rather in that happy medium where the plants will be more conveniently

reached. Should the pond or lake be of varying depth, as is usually the case, the stronger growing Marliacea kinds should be planted in deeper places, while such as the Laydekeri and odorata varieties may be given places in the shallower water near the sides of the pond. Where a large or representative collection of these Nymphæas is grown, flowers are usually available from the end of June to October, many delightful flowers appearing in open seasons quite late in the latter month.

Varieties to grow.—For ponds or lakes of large extent the following will be found quite the best varieties: *N. Marliacea albida*, pure white; *N. M. carnea*, white and blush with golden anthers; *N. M. Chromatella*, sulphur-yellow with marbled leafage; *N. M. flammea*, reddish-crimson; *N. M. ignea*, carmine-red-orange stamens; *N. M. rosea*, one of the best, and delightfully fragrant; and *N. M. rubra punctata*, one of the largest and most profuse flowered of the group. *N. tuberosa*, with its varieties Richardsoni and rosea are also of vigorous growth and suited to deep water or the larger water areas. Other good kinds include William Dougue, satiny-pink, and William Falconer, ruby-red; while the improved form of the white water-lily, *N. alba plenissima*, is worth a place among the best. *N. atropurpurea* is one of the darkest coloured of the more vigorous sorts and worthy of special notice.

For smaller ponds, fountain basins, rock gardens, pools, and the like, the varieties of *N. Laydekeri* and *N. odorata* are admirable; the varieties of the former including *fulgens*, amaranth red; *liliacea*, rose lilac to crimson; *rosea*, *rosea prolifera*, and *purpurata*, all beautiful in colour, while some have delightfully fragrant flowers.

The varieties of the *N. odorata* group are particularly valuable by reason of their medium-sized flowers, which are freely produced, and for their colouring and fragrance. These are valuable also for growing in tanks or tubs, and include some of the most delightful of aquatic flowers. *Alba*, *gigantea*, *rosea*, the vanilla-scented *sulphurea* and *sulphurea grandiflora* are the best. The miniatures of the race, *N. pygmæa alba* and *N. p. Helvola*, are excellent in tubs or even for aquaria.

Tub and tank cultivation differ only in the necessity for an occasional change of water, unless the receptacles can be so arranged where a supply can be laid on by hose-pipes or otherwise for the purpose. Tubs containing these water-lilies appear more natural-looking when sunk to one-half of their depth, and with not more than six inches of soil for the plants to grow in are capable of affording much interest by reason of their beauty and free flowering.

The blue Nymphæas form a lovely race, but

they must be grown in a tank or tanks, the water in which is warmed by means of hot-water pipes. Mr. Hudson, who is superintendent of Mr. Leopold de Rothschild's garden at Gunnersbury House, near London, grows these flowers to perfection, and has raised one variety of exceptional interest, *N. gigantea Hudsoni.* The deep blue flowers frequently measure nearly a foot across. Other noble kinds are *N. stellata* (Berlin variety), *N. gigantea*, *N. pulcherrima*, *N. William Stone*, *N. zanzibarensis*, one of the most familiar of this group, and *N. scutifolia.* The flowers are useful for cutting, and when fully open on a summer day are a rich picture of blue colouring in various shades.

Aquatic and Moisture-loving Plants

Alisma natans. Masses of white flowers; the plant floats on the water and should be simply put on the surface; it will soon develop.

Aponogeton distachyon (Water Hawthorn). A well-known water-plant which must have about two feet of water for its sustenance. The flowers are white and with a hawthorn-like scent.

Calla palustris (Bog Arum).

Hottonia palustris (Water Violet).

Hydrocharis Morus Ranæ (Frog Bit).

Menyanthes trifoliata (Buck-bean). For shallow water; the flowers pinky white.

Orontium aquaticum (Golden Club).

Ranunculus aquatilis (Water Buttercup).

Ranunculus Lingua (Great Spearwort) and its fine variety grandiflora, which has larger flowers, rich yellow in colour. Both are plants for the water margin.

Sagittaria sagittæfolia (Arrowhead). White flowers; shallow water.

Sagittaria variabilis, fl. pl. A double form of the type, the Japanese arrowhead, flowers pure white; also for shallow water.

Stratiotes aloides (Water Soldier). White flowers; a well-known water-plant.

Villarsia nymphæoides. A native water-plant which floats on the surface. The flowers are yellow, and as the specific name indicates they resemble those of a water-lily.

Acorus Calamus (Sweet Flag). This is of vigorous growth.

Butomus umbellatus (Flowering Rush). Flowers bright pink.

Marsh Marigolds (Caltha). Of these the most striking is C. polypetala, which is certain to become popular when it is more freely distributed. A colony of this by water-side is a rare picture of yellow colouring. It enjoys very moist soil, even when the roots are covered with water. The ordinary Marsh Marigold (C. palustris) has a double form.

Forget-me-nots (Myosotis). The pretty flowers of the Water Forget-me-not (M. palustris) give a cloud of blue to the margin of brook, stream, or lake.

Parnassia (Grass of Parnassus) Caroliniana. A charming plant with snow-white flowers and distinct foliage. Must be placed at the edge of the waterside, as it only grows twelve inches high.

Apart from flowering plants many kinds that are welcome for the beauty of their stems or foliage should be considered. A variegated Rush (*Juncus effusus aureo-striatus*) is very beautiful, also *Juncus zebrinus*, the Reed Mace (*Typha latifolia*), and the Wild Rice (*Zizania latifolia*).

CHAPTER XXXII

THE HEATH GARDEN

THE heath in its many forms is winning its way into the hearts of all who love their gardens, and this chapter is not out of place on a subject that concerns chiefly rock, wall, and water gardens. No group of shrubby plants has closer affinity with the rock garden than the exquisite family known as the heath, or Erica, which until recently has suffered undeserved neglect. But the great possibilities of the family are becoming apparent, and no one has written more ardently in their favour than Mr. William Robinson, in whose beautiful garden surrounding Gravetye Manor, the finest of the heaths are planted in a way to make one realise their value for grouping amidst suitable surroundings. No better advice can be given than that of Mr. William Robinson in *Country Life*. He there mentions that "The landscapes of the British Islands and Western Europe owe much to the heath; but these have been slow in coming in any effective way into

A HEATH GARDEN WITH SCOTCH PINES IN BACKGROUND.

gardens. It is true that many close gardens are not the best suited for them, and that they are happier where there is room to treat them in bolder ways than is easy in the small places. I began rather slowly and doubtfully with them, charmed at first by the little Alpine forest heath, and even that is generally so ill-grown that we seldom see the fine effects it may give. The next that charmed me were some of the bright forms of the grey heather (*E. cinerea*), and so I went on until one cold winter's day, when searching in a nursery for wholly different plants, I saw a beautiful little bush of rosy-tinted flowers, and this was the Portuguese heath (*E. lusitanica*). That settled me as a heath-lover, and I have planted as much as I could get of it since. For many years it has been a pleasure, as it is good enough to flower all the winter and far into the spring. Last year, (1907) was so cold and cloudy that it did not ripen its buds, and it only appeared in flower this year three months later than usual. Just now, in March, this plant is in great beauty, and with it in bloom is the little Alpine forest heath and hybrid heath, all in masses. Usually this fine bloom occurs a month or two earlier in the South of England, so that one may say that you may enjoy the beauty of the heaths all the year round, and the effect of the heath stems is always good. But the best effects are not to be got without

massing and grouping, and therefore it is in gardens where there are dry banky places in which 'nothing else will grow,' or on some spread of poor land, that we get their best effects. Rich soil is never wanted for them. We mostly begin with the idea that they want peat, and certainly they do very well in peaty and sandy soils; but in many cases they grow in cool loamy soil without a particle of peat and very little sand. Even the charming Connemara heath is quite happy in such soil. As regards their endurance, some of the heaths will grow in anything or nothing. Near me there is a railway cutting very high and facing due south and without much soil, as most of it was removed. I suppose the seeds of the heath floated in, or how should they come there and cover it so beautifully? I have watched them in hot years like 1893, and they flowered in that position when there was no rain for months, and never shrank or withered. A heath garden need not be rocky or in any way pretentious, but quite simple, for heaths do as well on level grounds as on the moorland rocks. Though they grow best, perhaps, in peaty wastes, it would be a mistake to suppose that only such soils can grow heaths well. Some kinds even flower better on loam than on peat. If rocky banks or large rock gardens already exist, the dwarfer heaths may often form their best adornment; but

such are by no means necessary. Their fine effects are best known to those who see them on moors in broad masses. These can hardly ever be shown in small gardens, but why should they not be in large ones? It is by no means necessary to have a garden to cultivate heaths in a bold and picturesque way, as almost any rough open ground will do, and some kinds will do among bushes and in woody places. The larger heaths, where grown, should be massed in visible groups, and the dwarf ones seen in dwarf masses also, and not treated as mere 'specks' on rockeries, or used as edging plants only;" but I cannot do better than allow Mr. Dallimore of the Royal Gardens Kew, to give the following admirable advice :

Persons of artistic tastes will perhaps consider the plants for associating with the heaths. Native or European plants which frequent like places are the best, such as the brooms and furzes, particularly the little furze that flowers in autumn ; some of the dogwoods also, such as the red form of Florida, and one Japanese dogwood (Kousa).—These two dogwoods can hardly be recommended for general use for it is only occasionally that they do really well.—Ed.—Some of the dwarf barberries and butcher's broom, and perhaps the dwarf Rhododendrons of the mountains of Europe if the soil suits them. We allow the native grasses and

other plants to grow among the heaths, not attempting to hoe and clean as in a garden, except when a certain rare kind is newly planted, when the ground is kept open until it is established. If one has mossy stones about, it helps in effect and also cultivation to place a few amongst the heaths, especially when planting new kinds.

The beauty of heaths when growing naturally has led to their introduction into gardens, and the various kinds and their near allies may be counted amongst the most free flowering and showy of shrubs. The British kinds alone are sufficient to make a garden bright for many months, but when species from other European countries are included, it is possible to have some kind in blossom the whole year.

Unfortunately, several of the southern European species are only sufficiently hardy to succeed in the milder countries, that is in the south and south-west of England and Wales, the West Coast of Scotland, and most of Ireland, or in places where sixteen degrees of frost and upwards are rarely experienced. This prevents those in cold districts making use of many of the larger-growing kinds.

Ten or fifteen years ago heaths were planted far less extensively than at the present time, and they were then used almost exclusively in small groups in the foreground of shrubberies or as an edging to paths and borders. This, though it

had the desired result of giving touches of colour here and there to the garden, was not an effective way of growing the heaths, therefore of late years, the practice has developed of planting them in wide expanses. Heaths are now included amongst the plants of which a special feature is made in gardens, and the "Heath Garden" is becoming as welcome as the "Bamboo Garden," "Wall Garden," or "Water Garden."

Making the Heath Garden

When choosing a site for a heath garden first consideration should be given to the character of the ground. Heaths are essentially peat-loving plants, and the best results may naturally be expected from land containing peat. Satisfactory results are, however, obtained, as Mr. Robinson has pointed out, from a loamy soil, whilst good plants may sometimes be seen in clayey ground providing lime is not present in any appreciable quantity. Should the soil be very limey the heath garden idea had better be abandoned, for with one or two exceptions lime is fatal to heaths and their allies.

The position of the heath garden is not important, providing it is not in dense shade. A comparatively steep hillside, gently undulating ground, or a level expanse, may all be dealt with effectively, whilst equally beautiful pictures may be formed by allowing the plants full freedom in

the wilder parts of the garden or grouping them in a more restricted way on a well-kept lawn. Whether the heath garden is confined to a restricted area or is represented by a wide expanse, however, simplicity should be the keynote of the whole scheme, and any elaborate arrangement of beds in fanciful designs should be condemned. Where it is necessary to use more or less formal beds, as on a smoothly-mown lawn, they should be simple in outline, and plants and grass allowed to meet.

The question as to whether the heath garden be composed entirely of heaths, or whether allied plants and others which group harmoniously with them should be included, is an important one. The heaths proper are confined to the genus *Erica*, but the ling and Irish heath, *Calluna vulgaris* and *Dabœcia polifolia* respectively, are so closely allied that no one would grumble at their inclusion; but there are other plants in the order *Ericaceæ* which are beautiful when in flower, and might well be included with the heaths. Then there are the tall growing *Arbutus Unedo* and *Kalmia latifolia* which are invaluable for the outskirts of the lawn, especially in positions where it is necessary to have an evergreen screen to hide some feature which is out of harmony with the heaths. Certain coniferous trees may also be appropriately planted in the vicinity of a heath garden, whilst

no happier selection of a site can be made than that on which a number of old Scots pines stand, for the pine trunks, with their warm colouring here and there, rising out of a carpet of heather, form an effective picture. Conifers must be used with care, and anything of a golden or variegated character should be avoided. In this case the pines, firs, and spruces are preferable to the cupressi and thuyas.

In the colder parts of the country the inclusion of a few plants other than the heaths is more necessary than in the south, for the hardiest kinds are all of comparatively dwarf and wide-spreading growth, and taller subjects here and there relieve the flatness. In the south, however, the southern European kinds may be grown, and as some of them attain a height of twelve feet or more and are fairly upright, they give variety to the garden.

Heaths on the Lawn

Placed in such a position the garden must be more or less restricted. It should consist of a series of beds of simple design with, if possible, a shrubbery of irregular width about the outskirts, or on two or three sides. Moderately wide paths must be left between the beds, so that there will be no difficulty in mowing and keeping the place tidy. The beds must be large, but small ones

should be included here and there to form stations for specimen plants. In most cases it will be found advisable to plant a single kind in each bed, especially if the garden is large, but effective groups may be formed by the inclusion of several sorts which flower at the same time in a large bed. The shrubberies in the vicinity may be formed of groups of the various sorts, with species of *Arbutus* and *Kalmia latifolia* in the background, and groups of *Kalmia angustifolia*, *K. glauca*, *Leiophyllum buxifolium*, *Rhododendron racemosum*, *Ledum palustre*, *Bryanthus empetriformis* and *Bruckenthalia spiculifolia* in front. The positions allotted to specimen plants may be filled in southern gardens with *Erica mediterranea*, *E. lusitanica*, *E. arborea*, *Sciadopitys verticillata*, *Arbutus Menziesii*, *A. Andrachne*, the rarer Himalayan rhododendrons, and plants of similar character, whilst in gardens in colder districts rhododendrons and azaleas are a success. When once planted the heaths are frequently allowed to take care of themselves. Many kinds can do so, but all repay a little attention now and then. Heaths are planted moderately close in the first place, with the result that in a few years' time, if nothing is done, they have formed a dense mass. This cannot be called a defect in the case of the dwarf kinds to the extent that it can when applied to large-growing sorts which never look

better than when away from each other. To effect this, constant thinning is desirable. This thinning should take the form of the wholesale removal of many plants to allow of the better development of a few permanent ones, each of which will eventually assert its own individuality. The time spent on the removal of the flowers by slightly cutting back the shoots as soon as the flowering season is over, is well spent. In addition to keeping the plants shapely, useless growth is removed, and this encourages cleaner and stronger growth for the following year.

Grouping the Heaths

The more or less natural grouping of heaths and kindred plants is frequently attended with happy results. This may be accomplished either in the garden proper, or the wilder parts of the pleasure grounds. In the former instance, as is also important in the case of a heath garden formed on a lawn, it should be quite separate from and not in the direct view of flower beds filled with summer plants, for the two types do not agree and there would be a distinct discord. If this kind of heath garden can be arranged on undulating ground so much the better, for the naturally broken surface will dispose of any possibility of monotony occurring through wide expanses of dwarf-growing

sorts. Whilst laying out the garden a look-out must be kept for the possibility of forming groups of showy plants in positions where they will be seen from a considerable distance, but on no account should the whole garden be exposed. The object in view is to give a glimpse from a distance of a mass of rich colour.

In the garden under consideration a formal bed is out of place. Groups of irregular shape should be formed, with no distinct dividing line between the different species. Each variety must be encouraged to lose itself in its neighbour, two or three kinds mixing together naturally, by means of large bays or indentations on the outskirts of the groups. When planting masses of dwarf-growing kinds, introduce a few tall-growing species in groups of two or three to a dozen plants, and bays of dwarf kinds about the margins of groups of bushy species are equally desirable.

It is in gardens of this type that pines can be made to play an important part, particularly if old trees already exist. Pines, especially the Scots, Cluster, and Corsican, group admirably with heaths, whilst, if a few specimens of the silver birch occur in the same area, so much more picturesque is the effect.

Perhaps no great depth of soil occurs on the site on which the heath garden is to be formed, and here and there large stones and boulders rise

above the ground. Under such circumstances there is no need to remove the stones, for large masses of weather-worn stone rising here and there above the heather are welcome. The red sandstone of the hills in Cheshire may frequently be seen jutting out from amongst the heather, whilst the same may be said of granite in the Cornish wilds.

Paths are required in the heath garden and they should be quite informal, winding about amongst the plants without any suspicion of artificiality. They may be carpeted with short, wiry grass, such as is often found on an exposed hillside; be covered with the natural sand of the vicinity; or, in stony districts, stone and sand may be used in association. In any case dwarf heaths may be encouraged on the paths, here and there, as if they had sprung from self-sown seeds. As a setting to such a heath garden a plantation of pines at a short distance is charming, whilst the planting of a few rare trees is sometimes desirable.

Whilst it is not always convenient to form a garden chiefly of heaths, space may usually be found for one or more masses in or about a garden. Such groups always constitute a pleasant feature, whilst they may be made to clothe areas which are not suitable for plants needing more elaborate cultivation. Of late years, several such masses in the Royal Gardens, Kew, have provided much enjoyment, whilst advantage has been taken

of the protective character of the heaths to make them act as nurses for numerous choice plants which require a little special care and some root protection in winter. To the lover of heaths and choice shrubs these groups are specially interesting, for many rare plants may be seen in a comparatively limited area. Should special soil be required for any plant, it is an easy matter to remove a few heaths and prepare the ground.

When this method is adopted, plant spring and autumn flowering kinds in different groups, whilst the various forms of ling may also be kept apart from the heather. Although distinct groups of one kind are effective, delightful arrangements can be made by mixing pink and white flowered forms.

Cultivation

When heaths are not planted in ground where much lime is present, their culture need not deter any one from forming a heath garden, for they are easily satisfied. Where the ground is light, all that is necessary is to dig it over a foot or fifteen inches deep and, if possible, fork in three inches to six inches of peat or decayed leaves. Heaths should be planted firmly, and this may be done any time during autumn, winter, or early spring, when the weather is favourable. Pruning resolves itself principally into the removal of the dead

flowers after the flowering period, whilst manuring is unnecessary except an occasional top dressing of decayed leaves over the ground or around specimen plants. It is most important that beds should be kept free from weeds which, if once they obtain a good footing, are difficult to eradicate. Insect pests are not troublesome, but a plant parasite sometimes causes annoyance. This is a species of cuscuta, and it covers the plants with masses of thread-like shoots. Such plants should be burnt as soon as the parasite is noticed. Thin out the large-growing kinds occasionally in order that the remaining plants may develop into fine, well-grown specimens.

Propagation is done in two ways, *i.e.* by layers and by cuttings. Plants are layered in nursery quarters by weighting down the branches into fine soil with pieces of stone. They are left for two years before being disturbed. Cuttings are made from the points of shoots during July, August and September. Pieces about an inch in length are taken, and the leaves from the lower half are stripped off without injuring the bark. They are then dibbled carefully into well-drained pots of sandy soil, made very firm, or under a hand-light. In the former case the pots are placed in a slightly heated frame and roots are formed in about six weeks' time. In the latter case the cuttings root during winter. The points of the

shoots of the young plants are pinched out occasionally to induce a bushy growth, and in the following May the young heaths are planted thickly in the nursery. Two years from the insertion of the cuttings excellent plants may be obtained. Layering causes the least trouble, but plants raised from cuttings are usually more sturdy.

Plants are sometimes raised from seeds, and when this is done they should be sown thinly on the surface of peaty soil in small pots or pans. A sheet of glass should be placed over the surface of the pot, a covering of soil being unnecessary. Give water by soaking the pots, and do not allow bright sun to shine on them. The seedlings will appear in two or three weeks' time, and when large enough to handle, prick them off into boxes, the subsequent treatment being similar to that recommended for cuttings.

Protection.—In places where the more tender kinds are planted, a little protection should be ready in the event of more than sixteen degrees of frost being experienced. This is hardly likely to happen in Cornwall, but in the neighbourhood of London severe frost is not unknown. All the necessary protection consists of a scattering of dry leaves about the bases and dry bracken amongst the tops. All the covering must, however, be removed as soon as frost disappears. It is a good plan in the more northerly gardens to

insert cuttings of each tender kind in a pot annually and keep them in a cold frame all the winter in case of accidents.

The Selection of Heaths

Fifteen species of heath, with a number of varieties and one or two hybrids, may be expected to thrive in the warmer parts of the country, and all of them are found in Europe. In the following notes brief descriptions are given of the fifteen, those marked with an asterisk are unsuitable for the colder parts of the country.

* *E. arborea* (tree heath).—This is one of the commonest heaths found in the neighbourhood of the Mediterranean. In a mature state it is from eight feet to twenty feet in height. It forms an upright bush with numerous, well-clothed branches; the leaves are dark green and the flowers white, with reddish anthers. It is in full beauty from February to May, and the flowers proceed from short side-branches in such profusion as to almost hide the leaves. One point in favour of this heath is the delightful fragrance of the flowers. In Britain it rarely exceeds eight or ten feet in height. There is a distinct variety called *E. a. alpina*; it is of dwarfer growth than the type and more plumose. The leaves are also a different shade of green.

* *E. australis.*—Although this has been in cultivation for the greater part of a century and a half, it is still rare, probably on account of its tenderness. It is met with in Spain and Portugal, and forms a loose, straggling bush, four feet to six feet or so high. The flowers are larger than those of most hardy heaths and they are of a rich red shade; the flowering season is from March to May. It is an excellent sort to grow, for the flowers form a pleasing contrast to those of other kinds, whilst the loose growth gives a pleasing variety among sorts of denser habit.

E. carnea (winter heath).—This is one of the hardiest of the heaths. It is widely distributed through the mountainous regions of Europe, being common in the Swiss Alps. As a rule it forms a carpet six inches to eight inches high, and it quickly spreads over a considerable area. The flowers are red and appear from early February until late May. It is a charming kind and is less averse to lime than many others. This should be in every heath garden. *E. c. alba* is a white flowered counterpart of the type.

E. ciliaris.—In south-western Europe this is a common plant, whilst it occurs in England from Dorset to Cornwall. It is of rather weak growth, forming long, scandent, wiry shoots, clothed with tiny leaves which bear fine hairs on the margins. The flowers are red, and borne in terminal

inflorescences from June to September. *E. c. Mawiana* is a robust variety of the last-named and found in Portugal. It is very distinct from the type, being more upright in growth, and has denser leafage and showier flowers, which are deep red and borne from July until late autumn. It is undoubtedly one of the best of the autumn group.

E. cinerea is the common heather of our hill-sides and moorlands. It is found in most parts of the country, from Cornwall to the extreme north of Scotland and throughout Ireland, up to an elevation of more than 2000 feet. It also occurs in many parts of the continent. As a rule it grows from six inches to nine inches high, and may be distinguished by its deep green leaves and reddish-purple flowers which appear in profusion from the upper parts of the shoots. It has long been in cultivation, and by selection a number of varieties have originated, which are distinguished by the colour of their flowers. The best are as follows: *alba*, white; *alba minor*, dwarf white; *atropurpurea*, deep purple; *atrosanguinea*, deep red; *coccinea*, bright red; *polypetala*, purplish with finely cut petals; *purpurea*, purple; *rosea*, rose.

**E. lusitanica* (Portugal heath).—This is one of the commonest heaths in Cornish gardens, where it is frequently met with under the name

of *E. codonodes*. It is a native of both Spain and Portugal, and develops into a large bush with plumose branches clothed with vivid green leaves. It is somewhat hardier than *E. arborea*. The flowers are pinkish in the bud, but white when expanded. They are longer than those of *E. arborea* and scentless. It blooms with great freedom over a considerable season, which is from February until the middle of May, but frequently flowers are to be seen from November throughout a mild winter. It is a beautiful heath whether planted alone or in groups.

E. Mackaii.—Some authorities give this specific rank, whilst others consider it to be a hybrid between *E. ciliaris* and *E. Tetralix*. The general appearance of the plant certainly suggests the latter supposition to be correct, for it combines qualities which are found in the two species. It resembles *E. ciliaris* most closely in foliage, and *E. Tetralix* in the flowers; it cannot be said to be an improvement on either.

**E. mediterranea* (Mediterranean heath).—This is common in south-west France and Spain, but is said to be less so in the immediate neighbourhood of the Mediterranean than *E. arborea*. Mature plants attain a height of twelve feet, and these dimensions have been reached in the neighbourhood of London. By attention to pruning whilst the plant is young, shapely bushes are

formed, which grow into imposing specimens. The flowers are pinkish and borne from March to May. Several varieties are known, one of which, *E. m. hibernica*, is found wild in Ireland. *E. m. hybrida* is the best of the variations. It is a hybrid between *E. mediterranea* and *E. carnea* and flowers more profusely than any plant in the garden. It frequently commences to flower in November, and ceases in May, and during most of the time it is a mass of bloom. The flowers are reddish in colour. This heath grows twelve inches to fifteen inches high, and spreads rapidly. Other forms are: *alba*, white; *glauca* with bluish foliage, a comparatively worthless kind compared with others; and *nana*, dwarf in growth as suggested by the name.

E. multiflora.—This is a showy, autumn heath from southern Europe, with red flowers borne from the upper parts of the shoots so as to turn the ends of the branches into long, cylindrical inflorescences. It grows from twelve inches to eighteen inches high and forms a dense mass. It resembles the Cornish heath, *E. vagans*, in many ways, but in this case the terminal flowers open first, whilst in *E. vagans* they expand from the bottom upwards.

**E. scoparia* is a tall heath found wild in company with *E. arborea* in southern Europe. It is of strong growth, but less showy than other kinds, for the flowers are very small and greenish. It

supplies the wood from which briar-wood pipes are generally made.

E. stricta.—Although this is considered tender by some, it grows without injury at an elevation of 1100 feet in Derbyshire. It is of stiffer growth than most species, and forms an upright bush four feet or five feet high; the flowers are red in colour and borne freely during late summer and autumn.

E. Tetralix (the cross-leaved heath) is common in England, and extends over the greater part of northern Europe. It is recognised by the curiously angled arrangement of the leaves and by its terminal inflorescences of drooping red flowers which appear during late summer and autumn. Several varieties are known, of which *alba*, with white flowers, *mollis*, with woolly stems and leaves, and *rubra*, with deep red flowers, are the best.

E. vagans (Cornish heath) is found in south-west Europe, and is abundant in the extreme south of Cornwall, many acres of it being in evidence in the neighbourhood of the Lizard. From its prevalence in Cornwall the name of "Cornish heath" has been given; it begins to flower in August, and continues until October. The flowers of the type are pinkish, but there are white and red forms. As a rule it is about two feet high. The best varieties are: *alba*, with white flowers;

grandiflora, an exceptionally fine flowered kind; and *rubra*, which is of a reddish colour.

**E. Veitchii.*—This is a hybrid between *E. arborea* and *E. lusitanica*, and was introduced by Messrs. Veitch, of Exeter, early in the present century. It has white flowers, and combines the good qualities of both parents.

E. Watsoni.—This completes the most worthy of the hardy kinds. It is found in south-west England, and by some authorities is considered to be a natural hybrid between *E. Tetralix* and *E. ciliaris*; it is of somewhat straggling growth, and has red flowers during late summer.

LING, ST. DABEOC'S HEATH, AND SOME HEATH-LIKE PLANTS

THE LING (*Calluna vulgaris*).—This is closely related to the heather, and *Erica cinerea* and *Calluna vulgaris* grow side by side all over the country. Examination of the two plants will reveal quite a different arrangement of the leaves, which constitutes one of the chief distinctions between the two genera. It is found in all parts of the country up to an elevation of more than 3000 feet. A considerable difference in growth is noticeable, for, whilst in some exposed situations on hard, poor ground it is scarcely more than an inch above the ground, in loose rich soil it grows

between two feet and three feet high. In some places it is largely used for thatching buildings and for broom making, whilst a dye has been extracted from the branches. It flowers with delightful freedom during August and September, and the colour is usually a shade of red. It is, however, very variable, and many varieties are known. .For the heath garden these are preferable to the type, as they are frequently of neater growth. Some of the best varieties are: *alba*, *alba minor*, *alba pilosa*, *alba Serlei*, *alba tenella*, and *Hammondi* with white flowers; *aurea* and *cuprea*, with golden and coppery leaves respectively; *Alporti*, *rosea*, and *rubra*, with red flowers; *flore pleno*, with double red flowers; and *hypnoides*, *minima*, *Foxii*, and *pygmæa*, of dwarf, mossy growth. Of late years a trade has been established by growing the white-flowered kinds for cutting for the Scotch markets in August and September.

St. Dabeoc's Heath.—Botanically, this plant is known as *Dabœcia polifolia*. It is readily distinguished from both the heather and the ling by its larger leaves and racemes of bell-shaped, nodding flowers. It is usually from six inches to nine inches high, but under exceptional circumstances will grow somewhat taller. The flowering period is a prolonged one, for the *Dabœcia* opens its first flowers in May and continues in bloom

somewhat sparingly until August, when a great effect is made. The plants are a mass of bloom through August and September. The type bears red flowers, and there are white, and red and white varieties. The former is known as *D. p. alba* and the latter as *D. p. bicolor*.

The species is exceptionally useful for massing on a wide scale, and it is equally effective when the different colours are either seen in groups, or intermixed, so that the arrangement must be left to the individual taste of the planter. *Dabœcia polifolia* is a native of south-west Europe and Ireland.

Bruckenthalia and *Bryanthus*.—These two genera are well worth including with the heaths, for both are pretty flowered, heath-like plants. *Bruckenthalia spiculifolia* is the only species in the genus. It is a dwarf plant from eastern Europe and Asia Minor, and only grows a few inches high. The leaves are very small, and dark green; the flowers are white with a slight, pinkish tinge, and are borne in small, dense, upright heads in May. It grows under the same conditions as the heaths.

Bryanthus.—The only species which can be obtained in quantity is *B. empetriformis*, a north American plant, extending from British Columbia to California. It is of dwarf, heath-like growth and bears upright heads of red flowers during

May. *B. Breweri*, *B. erectus* and *B. taxifolius* are pretty kinds, but very difficult to obtain.

The Heath Garden during the Four Seasons

Spring.—From the middle of February to the middle of May the spring flowering kinds are at their best, and most effective are groups of *E. carnea*, *E. mediterranea* and its varieties, *E. arborea*, with its scented flowers, *E. lusitanica*, with its white blossoms and vivid green leaves, *E. australis* and *E. Veitchii*. Each one flowers with the greatest freedom, and when backed up with large evergreens, and relieved by the warm coloured trunks of Scots pines, the effect is charming. The dwarf kinds at this period form a striking contrast to naturalised bulbs, for the reddish colouring of some of the heaths makes a break amongst the yellow narcissi. The young leaves of deciduous trees and shrubs at this period also form a pretty setting for heaths in the vicinity.

Summer.—Between the middle of May and the middle of August these are in bloom: *Dabœcia polifolia*, *Erica cinerea* and its varieties, *E. stricta*, *E. ciliaris*, *Calluna vulgaris* and its varieties, and during the latter part of May, *Bruckenthalia spiculifolia* and *Bryanthus empetriformis*. About the middle of this season the greatest scarcity of

flowers may be looked for, but during the early and late weeks the garden will be full of bloom. This is the time when a certain amount of work will be required, for the spring-flowering kinds must be cut back and vacant ground well weeded. Only in exceptional cases will water be required, for if artificial watering can be avoided so much the better.

Autumn.—Autumn corresponds with spring with regard to the display of flowers. The spring kinds perhaps offer the choicer selection, but those of the autumn are possibly the more showy. They include *Erica stricta*, *E. cinerea* and its varieties, *E. ciliaris* and the variety *Mawiana*, *E. vagans*, *E. multiflora*, *E. Mackaii*, *E. Tetralix*, *Calluna vulgaris* and its varieties, and *Dabœcia polifolia*. From August until November flowers are to be seen, whilst during the greater part of the time the foliage is almost hidden with bloom. At this period, the contrast between the golden colour of the French gorse, *Ulex Gallii*, the decaying leaves of the bracken and deciduous shrubs, and the flowers of heather and ling are most pleasing; large areas clothed with these plants have a lasting effect on the minds of those who have seen them.

Winter.—Not even in winter is the heath garden without flowers, for *Erica mediterranea* var. *hybrida* is in bloom, so also in some places is *E. lusitanica*. During winter the tints of the

evergreen foliage can be appreciated more thoroughly than at other periods of the year, and to some the dried flowers of the autumn-blooming kinds possess charm. Those who prefer to see their plants cut over as soon as the flowers fade will find work in pruning, whilst at this season replanting and additions to the garden must be attended to.

From this it will be seen that a heath garden is not without interest at any season of the year, and for a considerable period it is full of beauty.

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Bulwick Hall, Northampton
Casa de Pilatos, The, Seville
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Chatsworth, Derbyshire
Cleeve Prior Manor, Worcestershire
Clevedon Court, Somerset
Clifton Hall, Nottingham
Compton Beauchamp, Berkshire
Condover, Shropshire
Drayton House, Northampton
Elvaston Castle, Derbyshire
Fountains Hall and Abbey, Yorkshire
Franks, Kent
Great Tangley Manor, Surrey
Guy's Cliff, Warwick
Hall Barn, Buckinghamshire
Hall, The, Bradford-on-Avon
Ham House, Richmond
Hardwick Hall, Derbyshire
Heckfield Place, Hampshire
Henbury Court, Gloucestershire
Heslington Hall, York
Hever Castle, Kent
Holme Lacy, Hereford
Ightham Mote, Kent
Kelly House, Tavistock
King's Weston, Gloucestershire
Kingston Lacy, Dorsetshire
Levens Hall, Westmoreland
Lilleshall, Shropshire
Longford Castle, Wiltshire
Loseley Park, Surrey
Lypiatt Park, Gloucestershire
Melbourne Hall, Derbyshire
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Risley
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